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ANTIQUE WIRELESS ASSOCIATION, INC.

HOLCOMB, NEW YORK 14469

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ERRORS IN OTB--

The last issue had its usual 5 or 6 typographical/spelling errors. Most noticeable was the spelling of Alvino Rey's name. We had it as Ray. Sorri OM.

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S.O.W.P. XMAS CW QSO PARTY

S.O.W.P. members are reminded to be on Dec. 17 & 18 and operate 55 khz up from low end of each amateur band for a good time and renew old acquaintances.

LETTER TO A.W.A. at HOLCOMB ??
Send S.A.S.E. for prompt reply..

COMING EVENTS

ANTIQUE WIRELESS ASSOCIATION

JANUARY	Old Timers CW Contest Jan. 11,12 and 19,20
APRIL	California Historical Radio Society and A.W.A. Meet Los Gatos, Calif. April 22
MAY	Indiana Historical Radio Society and A.W.A. Meet Auburn, Ind. May 5 and 6
	AWA Museum Opens May 7
	A.W.A. Spring Meet, Museum & Ionia, N.Y. May 13
	N.Y.S. ARRL Convention Rochester, N.Y. May 20*
JUNE	Rome Hamfest (Exhibit) Rome, N.Y. June 3*
	South-East AWA Regional Conference, Winston-Salem, N.C. June 9,10 and 11
JULY	Southern Tier A.W.A. Meet Breesport, N.Y. July 15
AUGUST	Central N.Y. A.W.A. Meet Kirkville, N.Y. Aug. 26
SEPTEMBER	National A.W.A. Conference Canandaigua, N.Y. Sept. 29,30
	*To be confirmed

FROM HEADQUARTERS

SILENT KEYS

BILL WILSON- W2PW, Ithaca, N.Y.
JOHN ALLENDER-W3CJN, Baltimore, Md.

HISTORICAL DOCUMENTARY

Thorn Mayes has nearly completed an in-depth research paper on Lee deForest and his activities and is now gathering material for a second paper on Fessenden. Knowing Thorn's thoroughness, members can be assured of excellent documentaries on two well known pioneers.

Tired of Waiting?

for your Bulletin --------..
A survey was made of the September OTB which was mailed during the last week of August. First Class mail arrived in most places within a few days -- but wow (!)-- what happened to the other ?

A check with the Rochester P.O. revealed all Bulletins were sent out the day after delivery. Then the fun began.

Some members in nearby states had their copy within a couple days while one member who lives only 10 miles of Rochester had to wait three weeks!

The problem ? -- strictly in your local P.O. or area distribution center. 2nd and 3rd class mail is frequently delivered at the whim of the local postmaster. May we suggest you give him a call.....

What's Coming Next!

in the "Old Timer's Bulletin

"OLD CORTLAND STREET"

"HISTORY OF BARKER & WILLIAMSON

"REVIEW OF 1977 AUCTION"

"HISTORY OF DAY-FAN RADIO"

"THE PARAGON TRANSMITTER"

"HISTORY OF WESTERN COIL CO."

"HISTORY OF COLONIAL, KING AND SYLVANIA RADIO COMPANIES"

"COLLECTING BATTERIES"

"HISTORY OF THORDARSON CO."

FM Repeater

Members traveling in the Rochester, N.Y. area are invited to call in on the Victor 2 meter repeater operating on 22-82. The machine is owned and operated by AWA Board member Henry Blodgett, W2UTH/FRL and is located only 5 miles north of the AWA Museum, K2KLP, K2WW, N2JM, W2ICE/AN, W2VTR are but few of the several AWA members who monitor 22-82.

The Easy Answer

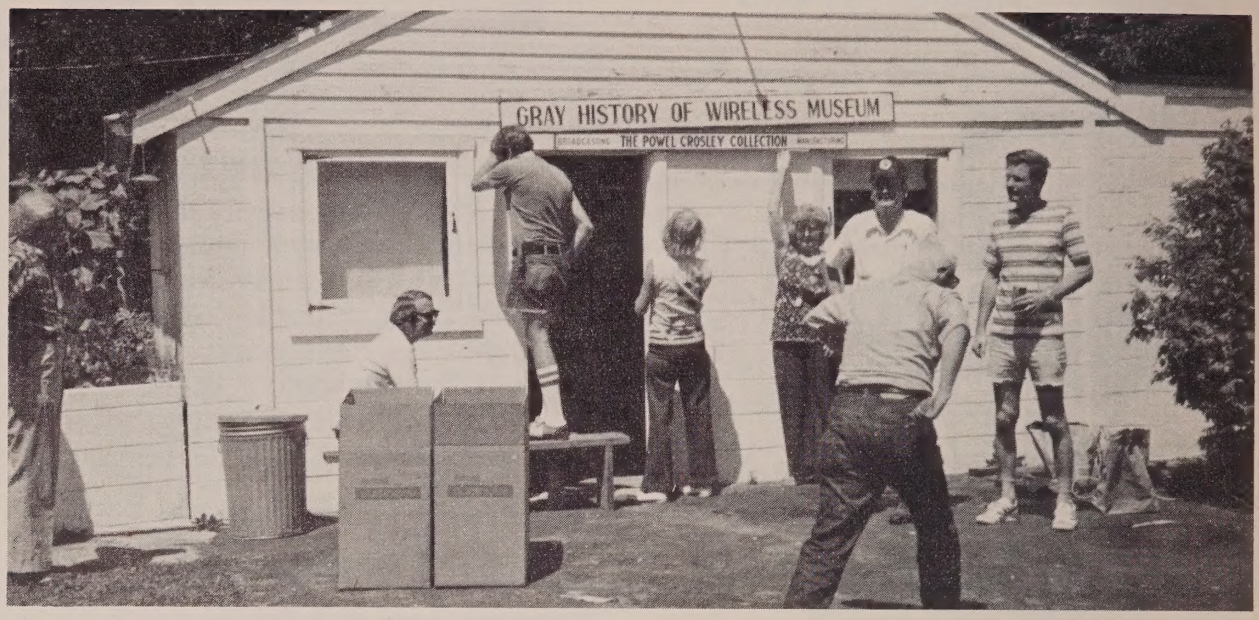
for a club program is the A.W.A.
SLIDE SHOW with TAPE COMMENTARY

Members who need program material for a radio club meeting will find the AWA 40 slide show and 32 minute tape cassette commentary ideal. In fact, it is even a great program for one's personal use.

The slides show all kinds of radio material in the AWA Museum with tape telling about the various pieces of equipment and its history. We might add the commentary was made by former CBS radio announcer Stew Metz. The show with tape is yours for only $21 postpaid. Make check out to A.W.A. and mail to:

AL CRUM
16 COSTAR ST.
ROCHESTER, N.Y. 14608

GRAY MUSEUM IS MOVED



ON THE MOVE ! [Photos by John Bruning]

Great news ! Jack Gray's Radio Museum has been moved and now on display at the new Crosley Community Center located at 1223 Central Parkway in Downtown, Cincinnati. The center is also the home of stations WCET-TV and WQLA-FM. A group of loyal amateurs headed by Johm Bruning (W8DSR) made the move.

INVENTORY OF RECEIVERS AS PACKING TAKES PLACE

Jack Gray (W8JDV), a Charter AWA member, had one of the finest radio museums in the country at the time of his untimely death in 1970. Originally a Marconi ship operator, Jack later worked for the Precision Equipment Co. and then the Crosley Company where he was a manufacturing supervisor. He joined the broadcast division in 1937 (WLW) and retired from their "Voice of America" station in 1965. He was the author of the book "Bits of Wireless" and several exceptionally fine slide/tape shows including the "Crosley" and "Grebe" Stories. His farsightedness in establishing a Foundation to handle his radio collection after death is to be commended. Others should give thought as Jack did, to the ultimate disposition of their radio material.

THIS MONTH'S BROADCAST RECEIVER

DE FOREST MODEL W-6
BROADCAST
RECEIVER

This huge floor model receiver was made by the Deforest company in the mid-twenties and was one of his several attempts to break into the booming broadcast set field.

The cabinet has a walnut finish with a large ornate speaker mounted on top.

The receiver uses six tubes: 2 RF, Det. and 3 in the audio.

Not much information is available on this model. One at AWA appeared to be in poor condition. Production must have been very low with a minimum of advertising.

This particular set (photo) is owned by Richard Foster of Cochituate, Mass. Can anyone supply us with more information? Exact year manufactured ? Number of sets made, etc. ?

Ed. Note: Members are encouraged to send in pictures of unusual receivers. We prefer black & white glossy, any size. Make note of unusual features.

Alert List!

The following receivers were stolen from a member's home in central New York. If they appear for sale under suspicious circumstances, notify Floyd Bennett immediately.
--AK Breadboard Mod. 10, 5 tube Stromberg-Carlson, Freed Eiseman NR-6, Radiola III-A and Radiola III with amplifier.

Farnsworth

Members visiting the Foothill College Museum at Los Gatos, Ca. will have an opportunity to see Philo Farnsworth's original TV equipment made in 1927 [50th Anniversary].

An almost forgotten pioneer, he died in 1971 after developing a television system strongly competing with Zworkin's. He held 150 U.S. and 100 foreign patents. [John Anderson]

The 600 Meter Watch In Early Broadcasting

Robert M. Morris, W2LV, Sparta, N. J.

In the early nineteen twenties, persons or organizations desiring to get into broadcasting applied for and received a license for a "Limited Commercial Land Radio Station". Transmitting wavelengths of 300 meters and 600 meters were specified in addition to a normal wavelength of 360 or 400 meters. A receiving wavelength range of 300 to 600 meters was specified in the license and paragraph 7 of the license form stated "The station shall give absolute priority to signals and radiograms relating to ships in distress, shall cease all sending on hearing a distress signal and except when engaged in answering or aiding the ship in distress shall refrain from sending until all signals or radiograms relating thereto are complete."

This readily explains why early broadcasters were required to maintain a 600 meter watch and to sign off in the event of an "SOS". In fact a few stations occasionally tested their transmitters on 600 meters in order to fully comply with the terms of their license. By 1926 the class of license was changed to "Broadcasting" and no frequency other than the normal transmitting frequency was specified.

Many different types of receivers were used by broadcasters to monitor 600 meters. The famous IP-501 was popular with several stations. The most common receiving equipment, however, was that supplied by Western Electric as a part of their complete station facilities. The receiver supplied in 1922 was the WE 1A or 2C receiver. A good picture of the 1A receiver as used at WEAF in New York City appeared on the cover of the Old Timers Bulletin for September 1976. Early operators found the 1A to be rather insensitive but adequate to copy the local Navy radio station, NAH, and ships in the harbor. In 1924 the new and much improved Western Electric super-heterodyne type 4B or 4C was supplied for this service together with an antenna coupling unit and a filter for rejecting the local broadcast signal. This filter is shown in figure 1. WEAF used such equipment from 1924 until 1927 when the station was moved to Bellmore, Long Island. A slightly modified form of this receiver, the WE 4D, appeared in 1925 and was supplied to Western Electric equipped stations thereafter.

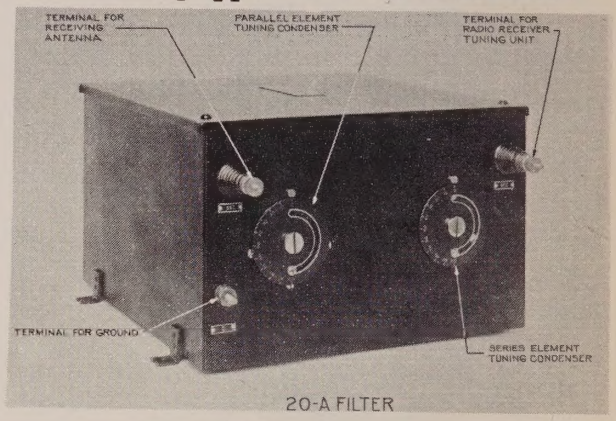


Fig. 1

The WE 4B or 4D receiver was comparable in sensitivity to those used by the coastal stations and frequently permitted the broadcast watch operator to hear a distress call as soon as, and sometimes before, operators of the Navy and other shore stations. WEAF had a good reputation for efficiency in this respect. One evening in June 1926, a power failure affected the entire building at 463 West Street, the transmitter site. This of course took the transmitter off the air although it did not affect the 600 meter receiver which operated on batteries. Very shortly after the power failure, the Brooklyn Navy Yard station, NAH, was heard on 600 meters inquiring about an "SOS". It turned out they monitored WEAF, and not hearing the station on the air, thought they had missed a distress call.

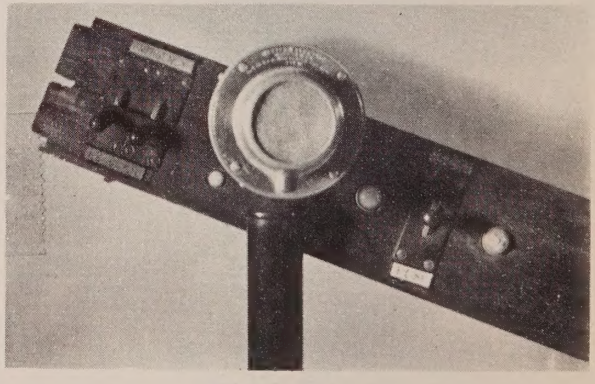


Fig. 2

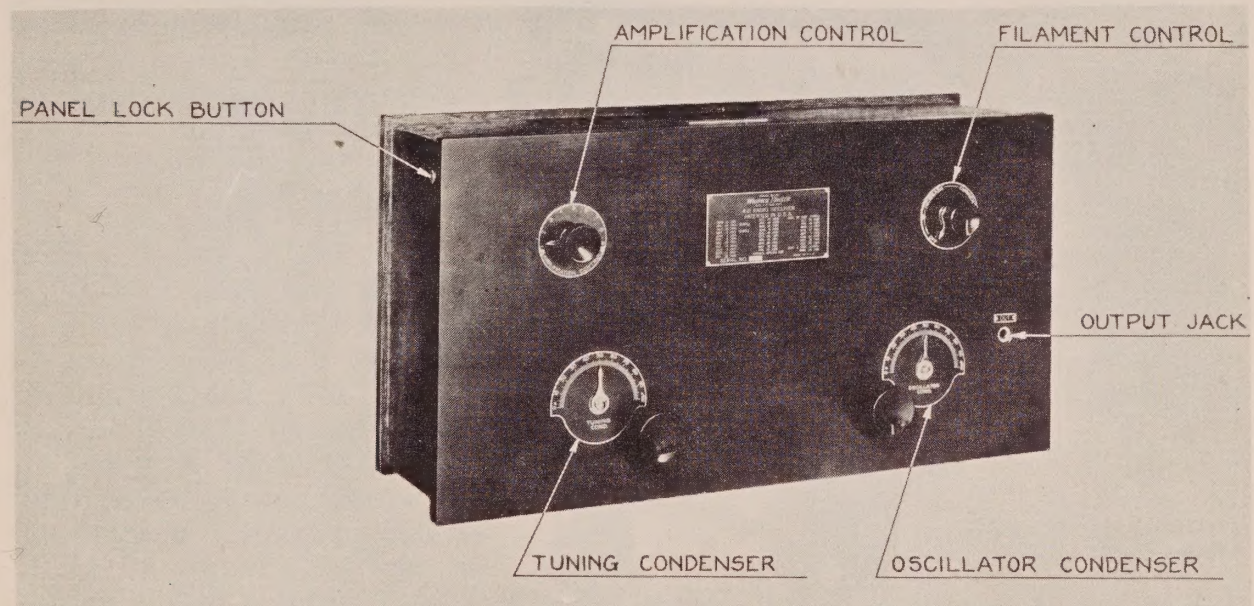
Figure 2 shows the switching panel used at the WEAF transmitter at 463

West Street to switch to a local microphone for an "SOS" sign-off announcement and the type microphone, a 371W, used for this purpose by the watch operator.

On June 10, 1929, General Order #66 was issued by the Federal Communications Commission implementing section 22 of the Radio Act of 1927. This order emphasized the absolute priority of distress signals and traffic and required a 600 meter watch by broadcast stations within certain distances of the seacoast. Great Lakes or any government or commercial marine radio receiving station. Stations operating on frequencies between 550 and 1000 kilocycles at a distance less than 100 miles and power of 25 kw or more were required to monitor for distress calls during periods of operation. It is evident from this that many broadcast stations were no longer required to maintain a 600 meter watch as of 1929.

first actions was to adopt and reaffirm existing regulations of the FRC.

In the Final Protocol of the Madrid International Telecommunications and Radio Conference of 1932 wording was such that means and methods of avoiding interference to distress traffic was left to the determination of the signatories. This was presumably approved by the U.S. Congress and was implemented by regulations released by the FRC on October 3, 1933. The regulation affecting the 600 meter watch was contained in Rule 180, (later in paragraph 3.161 of Part 3 of FCC Rules), relating to standard broadcast stations. This paragraph made it mandatory for a broadcast station to avoid interference with distress traffic, but permitted the determination to be made by a government (Navy) station or a commercial shore station with advice to the broadcaster if shutdown were required. It was also stated that the



4-D RADIO RECEIVER

The effective end of the 600 meter watch for most other broadcasters is believed to have come in 1933. This was shortly before the transition from the Federal Radio Commission to the new and expanded Federal Communications Commission. The Bill creating the FCC became law on June 19, 1934, and the first Commissioners were sworn in on July 10, 1934. The Federal Radio Commission was terminated on July 10, 1934, and the FCC opened for business the next day. One of their

Commission might require a distress frequency watch by certain stations.

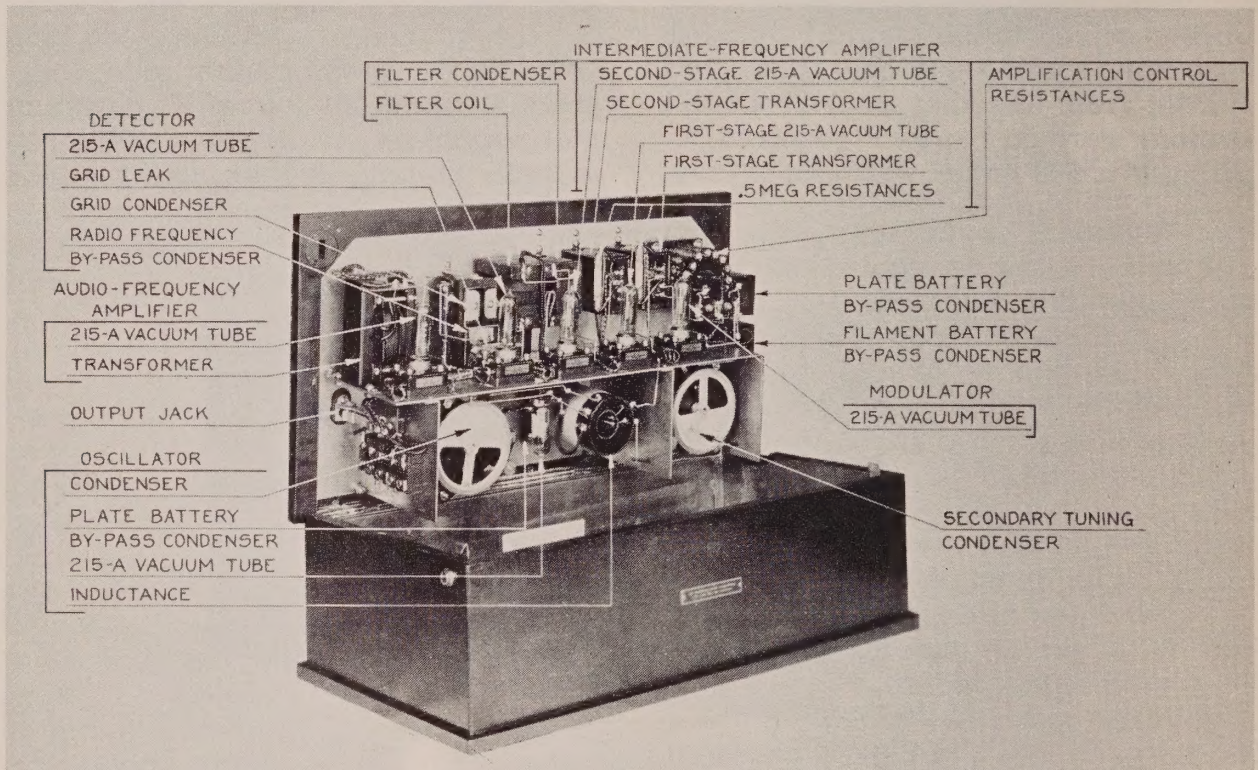
Art Goodnow W1DM of Darien, Connecticut, recalls that when KYW was transferred from Chicago to Philadelphia in December 1934, no provision for a 600 meter watch was included in the new station. It is highly probable that the monitoring of 600 meters was continued at many transmitters simply because the facilities were there and because the operators found it interesting to keep in touch with what was happen-

ing on the ship channels. Ralph Yeandle W2IK, recalls that operators at WGY monitored 600 meters at the time of the burning of the SS Morro Castle, on September 8, 1934.

Sam Newman W3HN, and transmitter chief at WRC Washington, D.C. in the nineteen thirties believes he was the last operator to sign a station off for an SOS. A distress call was heard at WRC about 1933 and Sam signed the station off for the "SOS". A quick telephone call from the manager informed him that it was no longer required to shut down for distress calls and that apparently the transmitter staff had not been informed of this change which had occurred a couple weeks earlier. Unhappily no definite date can be placed on this event.

In an FCC action of May 16, 1939, effective June 15, 1939, paragraph 3.161 was deleted leaving only the basic principle and requirement that absolute priority be given to signals relating to ships or aircraft in distress. A watch on 600 meters was no longer required by broadcasters.

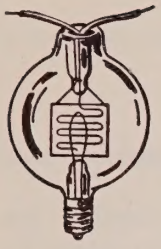
(Note: The information in the above was not easy to get and came from many sources, only a few of which are mentioned. If any AWA members have additional facts or anecdotes relative to the subject, the author would be happy to have them. Perhaps a sequel can be included in a future Bulletin.)



4-D RADIO RECEIVER

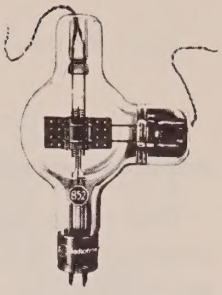
The 4-D and other W.E. monitoring receivers are highly prized by radio historians and collectors. The 4-D is a super-het using six WE 215-A tubes. Like all monitoring receivers, it is encased in copper and beautifully assembled. They are very difficult to find because of limited production and not being available retail. The A.W.A. Museum has a 3-A, 4-B and 4-D with appropriate filter and antenna tuning units. About the author: Bob Morris can write with some authority on the subject since he was a member of the original WEAF Staff in the 1920's. When NBC was formed, he was named Chief Development Engineer, a title he held until 1941 when he was made Manager of NBC Radio-Recording Division. Following WWII military work, he joined ABC from which he retired. Ed. -- B.K.

Other references: Type 4-B receiver--OTB 11-3-1, History of WEAF--OTB 13-2-5, W.E. licensing--OTB 17-1-24, Original WEAF--OTB 17-2-1, 17-2-14 and Early W.E. BC amp. -- OTB 17-3-18.



THE TUBE COLLECTOR

Conducted by Gerald Tyne

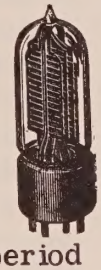


QUE.- I have two VT-1 tubes which are quite similar except one has a black fill and the other red. Which was made first ?

ANS.- The first VT-1 tubes were made at the New York Engineering Dept. of Western Electric Co. and used a reddish wax for filling the base. When the demand became great, manufacture was begun at the Western Electric Company's Hawthorne in Chicago, where a black wax was used. New York continued to use red wax in their production for some time, but eventually went over to black. Hence, it is impossible to say definitely which of your tubes was made first.

QUE. - Why is it necessary to have so many different identification numbers for the same tube in the early days ? As an example, the VT-1 was also the Type "J" tube as well as the CW-933.

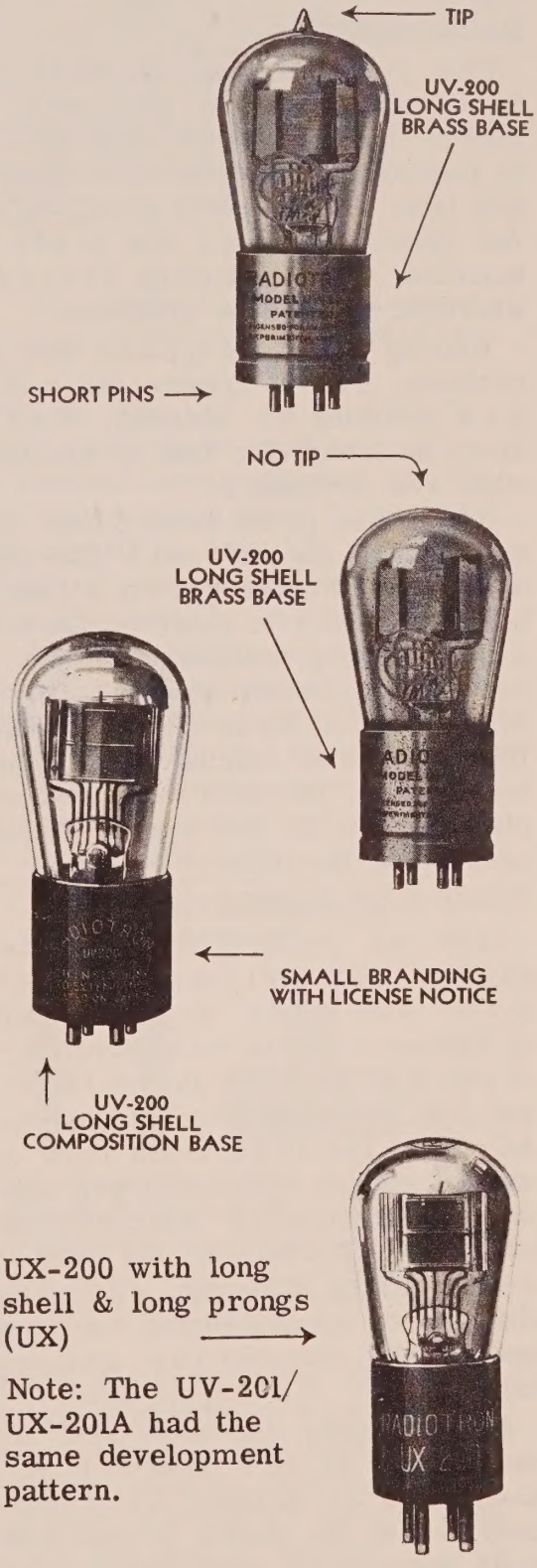
ANS.- This is a WWI tube used by the U.S. Armed Forces. At that time it was customary for the Army and Navy to assign their own designations. The Army assigned VT-1 and the Navy CW-933. During the early years of Western Electric tube development, before the issuance of formal manufacturing information, it was usual to assign a letter designation, and this tube during its period of development was known a Type "J". It was first coded 203B, then further improved and recoded 203D. But habits are hard to break, so many still call it the "J" tube.



DEVELOPMENT OF THE UX-200A

The original UV-200 (top) was made by G.E. and released by RCA in 1920. There were three types of UV-200's (as noted) before the UX-200 (bottom photo) was released in 1925. The short shell UX-200A became available in 1926. ⟶

UX-200A DEVELOPMENT



UX-200 with long shell & long prongs (UX) ⟶

Note: The UV-201/ UX-201A had the same development pattern.

AN EXCITING SIDE-LINE FOR ANY COLLECTOR

AUTOMOBILE RADIOS

The collector's shelf may display everything from early Marconi equipment to cathedrals but rarely a car receiver. Ever wonder why ?

BACKGROUND

The first practical car installations were made in the early 1920's. The receivers were usually conventional regenerative sets and later TRF models using 201's. An improvised shelf was made somehow with batteries stored wherever room was available.

Placing the horn speaker was a problem, but a greater difficulty was erecting an antenna. Yes, erect an aerial for that is exactly what was necessary.

Sometimes poles were placed at each end of the car and a flat-top antenna of several wires strung between them! On other occasions a regular loop antenna would be used with an early super-heterodyne. Most of these custom installations were in touring cars. Needless to say, the sets were seldom played while the car was in motion because of the noise.

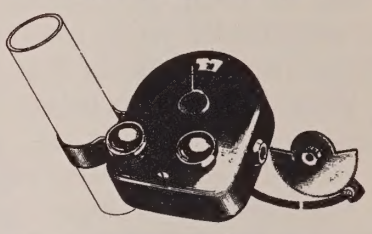
FIRST CAR RADIOS

One of the first receivers designed for automobile operation was made by Paul Galvin of Chicago. Galvin manufactured A and B eliminators in the 1920's and just before 1930 made custom AC sets. The 1929 crash left a market glutted with receivers selling at a fraction of their original price. Galvin, realizing the need to do something different, conceived the idea of manufacturing radios specifically designed for automobiles.

A pilot model was made and demonstrated at the 1930 R.M.A. Convention at Atlantic City (the only one at the show). It met with mild success but gave Galvin confidence to go ahead and design an improved model which resulted in several sales. The modern car radio was born.

Galvin named his receiver "Motorola" and was one of the first to use a steering column control head, electro-dynamic speaker and super-het circuit in a car. A major breakthrough came in 1932 when his company perfected the vibrator power supply this eliminating "B" batteries.

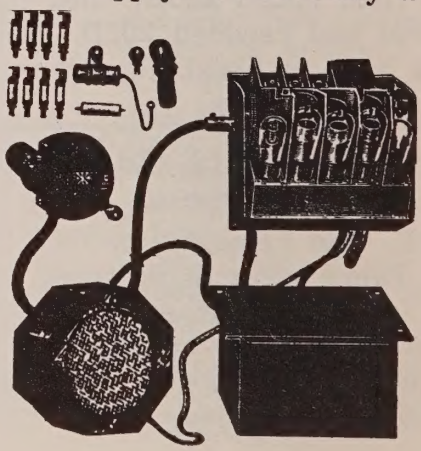
AUTO RADIO REMOTE CONTROL UNIT

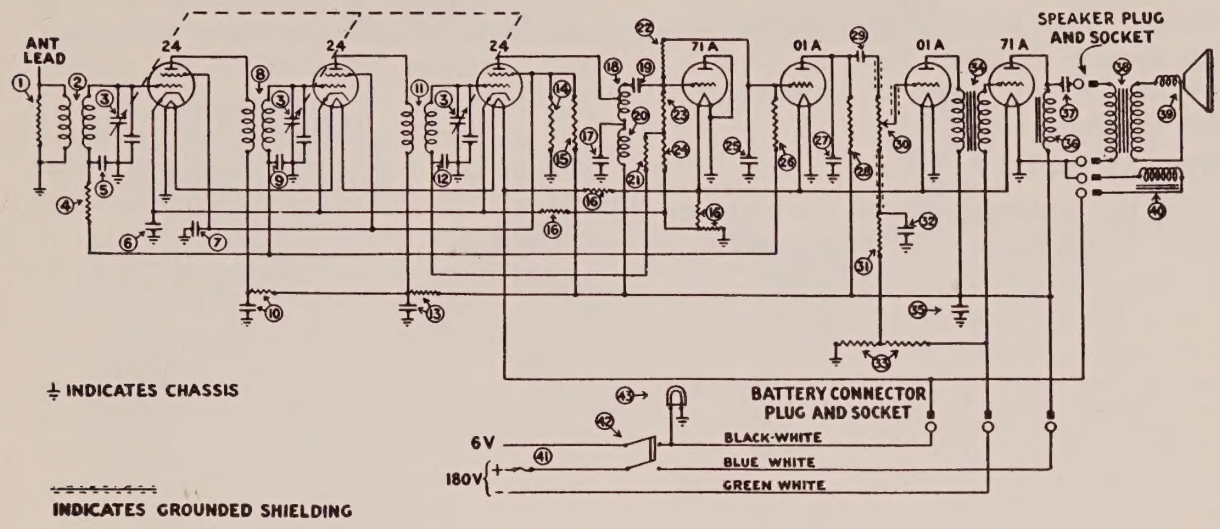


BASIC DESIGN

Motorola was not entirely alone in the field. There were others including Philco. Shown is a circuit used in one of their early models. Note the tubes are conventional types and not designed for car operation.

The first sets usually consisted of several metal boxes: the receiver, a large speaker housing and a "B" battery container. The latter was eventually eliminated with the introduction of the vibrator power supply. Practically all





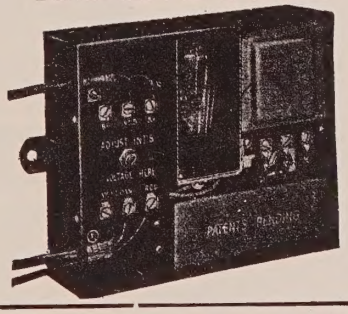
early models followed Galvin's method of having the controls (tuning knob, volume and off/on switch) mounted in a small box clamped to the steering column. Two flexible metal cables ran from the box to the receiver mounted somewhere below the dash or instrument panel. Automobile designers in those days were not leaving much room behind the dash for a large metal box. Take a look at some of the cars made in the early and mid 30's and you will see what I mean.

POWER SUPPLY

For awhile the power supply was an external unit. Dynamotors such as a "Genemotor" were used as well as batteries and vibrator units.

UTAH FULL WAVE AUTO "B" ELIMINATOR

Delivers 180 Volts at 40 Mils.

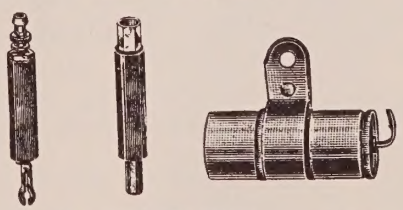


In time a synchronous vibrator was designed that would also rectify the high voltage thus eliminating the fullwave rectifier tube (84, OZ4, 6X5, etc.) This device had its shortcomings with many companies preferring a rectifier tube.

After the war, 12 volt battery ignition systems became popular. This enabled manufacturers to design a car radio around a new tube series requiring only 12 volts on the plate thereby completely eliminating the need for a power supply other than the initial source.

The low plate voltage (12. v.) frequently resulted in poor audio output. This shortcoming was eventually overcome with the introduction of the first power transistor which was used in the audio output stage.

AUTO INTERFERENCE SUPPRESSORS



SPARK PLUG SUPPRESSORS.
Stock No. E-49..... **20c** ea.
DISTRIBUTOR SUPPRESSOR
Stock No. E-50..... **20c** ea.
CONDENSER-GENERATOR SUPPRESSOR
1 mfd.
Stock No. E-51..... **35c** ea.

NOISE

Back to the early days. One of the greatest problems was noise. Here are some of the tricks early servicemen used to eliminate a a multitude of undesirable sounds when the car was in motion: individual spark plug suppressors,

(Continued on next page.)

distributor suppressor, "hash" filter choke, generator filter, dome light filter, grounding straps here and there plus four (4) wheel static springs. The latter was a pyramid type spring mounted between the axle and wheel cover to insure a good ground.

THE ANTENNA

Early antennas were mounted either in the fabric roof (cars of the early and mid 30's frequently had a frame roof covered with fabric) or mounted under the car running board !

The latter method was obviously necessary for touring and roadsters where the top was raised and lowered. Both methods were costly and cumbersome. The whip antenna made its appearance in the late 30's and simplified antenna problems.

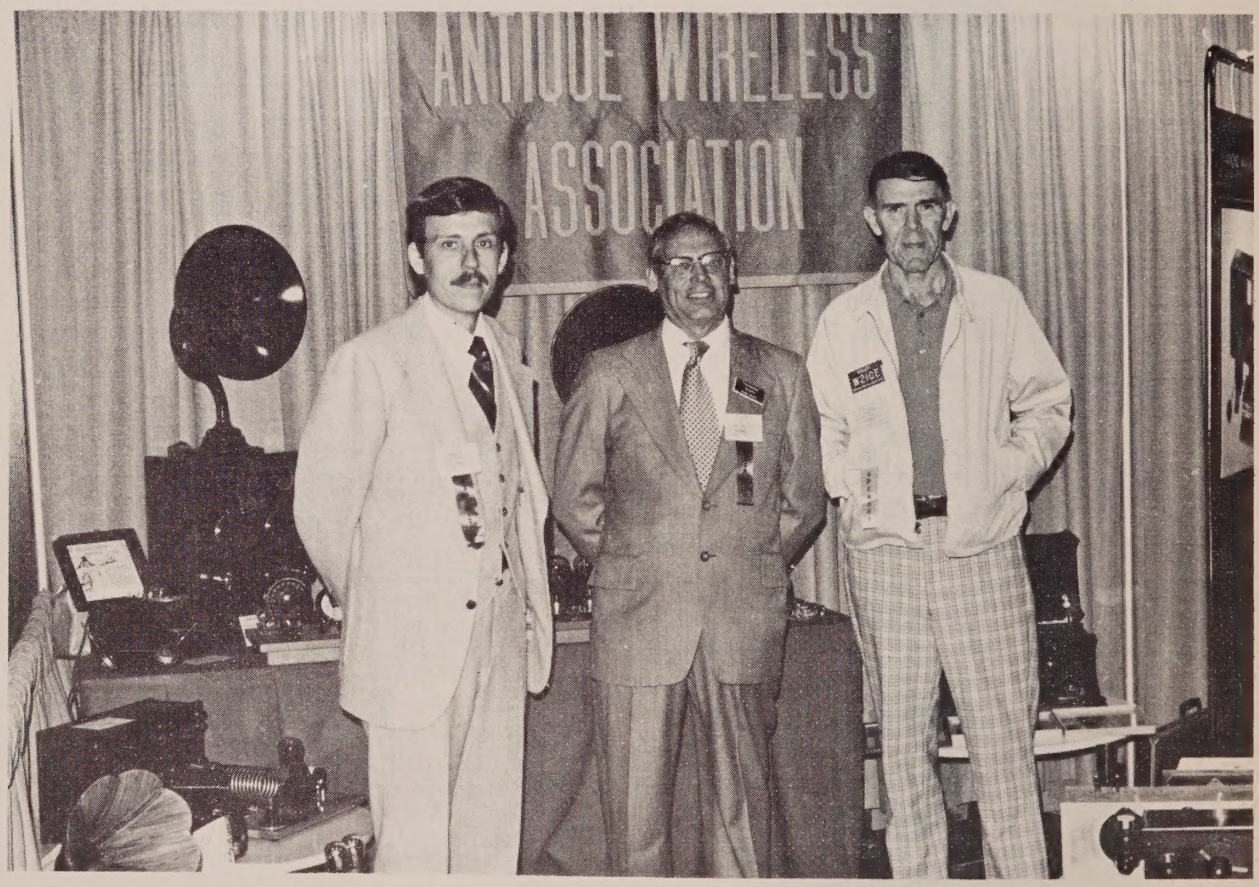
WHAT TO COLLECT

Discussing car radios with various AWA members reflects either a negative attitude to all models or a preference for pre-war sets with tuning controls mounted on the steering column.

I am inclined to show some interest in the latter and definitely rule out all other types -- I see nothing glamorous in an old black metal box regardless of its age or what is inside.

Radio collectors will find, however, real competition in locating the steering column control sets for there is another type collector more avid than he -- the antique car buff who may be restoring a car of that period and is willing to pay premium price for the same set !

-- Carl Zeigler

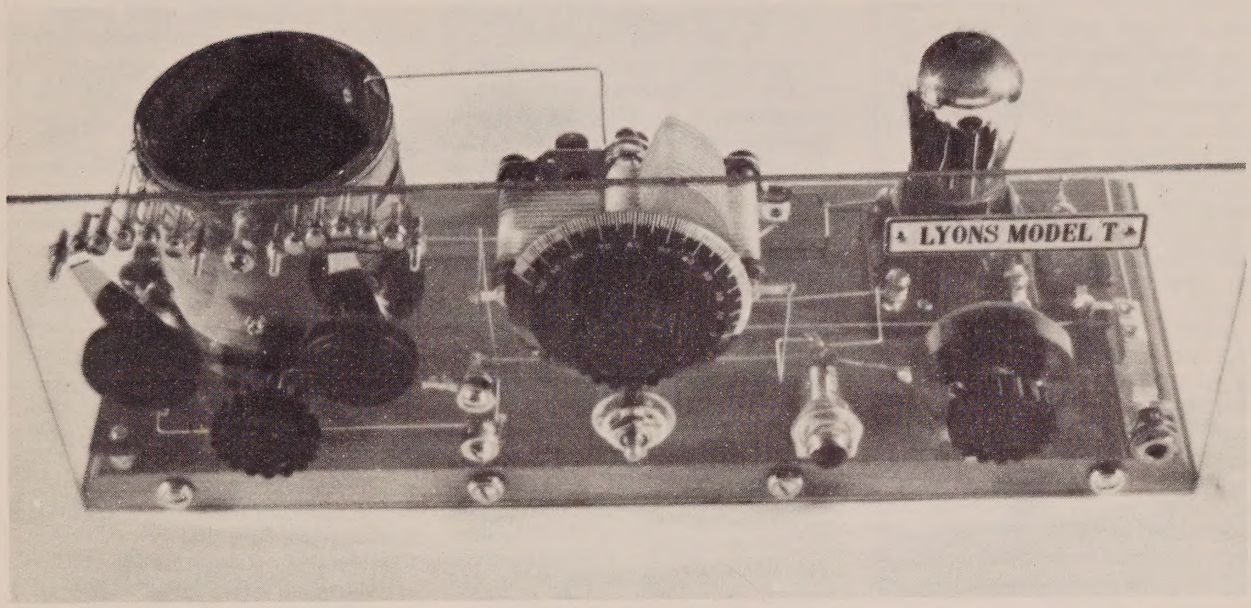


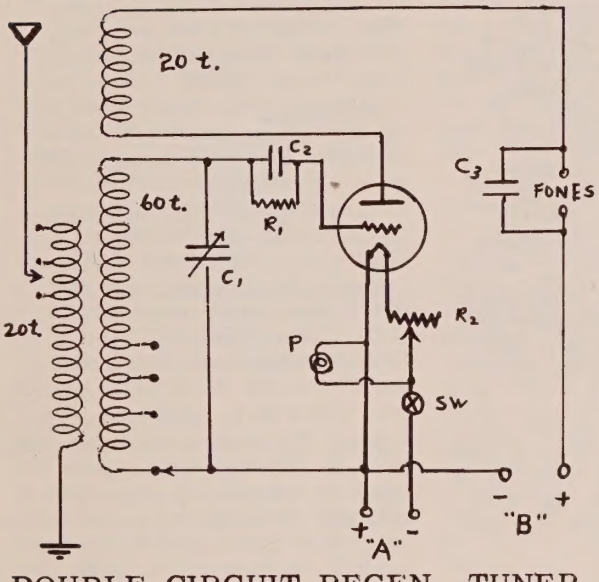
A.W.A. AT 1977 A.R.R.L. NATIONAL CONVENTION
(Photo by Al d'Eon, VE3AND)

Canadian amateurs were hosts to this year's National Convention held in Toronto where thousands of amateurs convened for a weekend of fine programming and demonstrations. Again, your Association was represented by both American and Canadian members (above) who manned the only historical exhibit. This is the 25th year AWA has provided exhibits and programs at an ARRL Convention.

l. to r.: Lou Vermond-VE3BDV, Fred Hammond-VE3HC, Bruce Kelley-W2ICE

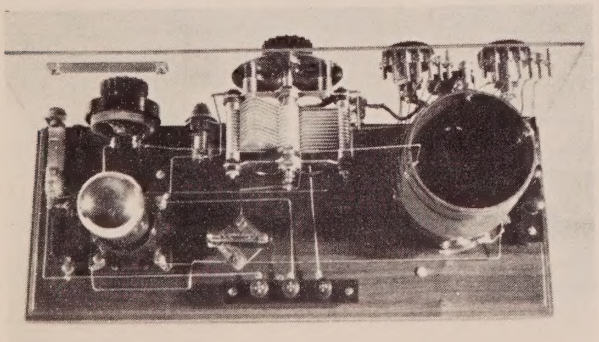
THE AMATEUR BUILDER





DOUBLE CIRCUIT REGEN. TUNER

C_1 --365 mmfd.	Ant. and sec.
C_2 --. 00025 mfd.	coils - 3 1/4"
C_3-- .006 mfd.	diameter
R_1-- 2 meg.	Tickler coil -
R_2-- 20 ohm rheo.	2 3/4" dia.
P -- Pilot lamp	"A" bat. - 6. v.
SW--Toggle switch	"B" bat. - 22. v.



The Good Old Days

LYONS MODEL "T"

Pictured is a one-tube receiver built by Floyd Lyons of San Francisco. He is to be congratulated on the set's neat appearance- in fact, others felt the same way since it won First Place as "The Most Unusual Set" at the joint meeting of the Southern California Antique Radio Society and the California Historical Radio Society.

The plexiglas (?) panel allows one to see the neat right angle bus bar wiring job in the rear. With only a 25 foot antenna and 22 1/2 v. on the 201-A tube, he has received 10 stations with good volume. He hasn't tried to identify the weaker DX sigs.

In addition to this set, Floyd has completed a Harkness Reflex (two-tuber) which works great and is currently working on a "Doughnut Five" which uses the green silk dough-nut type coils.

After this, he plans to tackle a Madison-Moore "One-Spot", then a 10 tube super !

Are there any other AWA members currently building early battery sets (not restoring) ?? We would like to hear from you-- and maybe a picture or two.

OLD TYME HAM ADS

OLD TYME ADS are FREE to members interested in collecting and restoring historical equipment as a hobby. They are not to be abused.

RULES FOR ADS:

1. Ad MUST be written on separate sheet of paper--not part of letter. Send SASE for acknowledgement.
2. Material must be over 25 years old and related to radio or electricity.
3. Give full address and Zip#.
4. AWA will not print repetitious ads or ones indicating regular sale for profit.
5. The Association is NOT responsible for any transaction.
6. AWA retains the right to reduce size of ad if over 8 lines including address.
7. Only ONE ad per issue per member.
8. Deadline for ads is 6 weeks prior to mailing date:

   March issue -- JAN. 15
   June issue --- APR. 15
   Sept. issue -- JULY 15
   Dec. issue -- OCT. 15

Important ! To insure delivery, out-of-state mail should be sent one week PRIOR to dates noted above.

Mail all ads to:

Antique Wireless Assn.
Main Street, Holcomb, N.Y.
14469 U.S.A.

WANTED

--Short Wave Craft magazines. Trade my extras for yours or will trade WD-11s for issues in good shape. Bill Orr, W6SAI, %Eimac, 301 Industrial Way, San Carlos, Calif. 94071

--Norden-Hauck, need original rf xfmr & construction blueprints (or copies) for 1928-9 NH Shielded Super-10 plus Instr. book for 1925 Jewell Test Set #95. T. Kuser, Box 648, Bordentown, N. J. 08505

--GR #247 tuning condensers 500 pf max. cap. or any GR tuning cond./500 pf max cap. 4 1/2"long x 4 1/8" wide brown roof-shaped AK pwr xfmr with 2.5 fila. Rodney Schrock, 402 Lincoln St., Somerset, Pa. 15501

--want Federal Tel. &Tel. Co. catalogs, literature, info., etc. to buy, trade or borrow. Needed for ARCA & AWA talk. Also need Fed. 55, 56 &DX58. Dick Schamberger, 515 Crescent Ave., Buffalo, N.Y. 14214.

WANTED

--Instruction manual (or copy) with circuit diagram of R.M.E. converter Mod. VHF 126. Write Norm Burton, 130 The River Rd. Revesby, New South Wales, 2212 Australia

--Need info on Varion AC receiver w/bat. elim., late 20s?. TRF: 4rf, 2 af stages, tubes: 5 199's and 1 -171. Varion trade name in Riders 1929 Manual. Mark Mohrmann, 107 Willoughby Pl. #3, Syracuse, N. Y. 13204

--sets using Kellogg 401 tubes: Mohawk, Marti, Crusader, Metro, Liberty, Case, etc. Need AK breadboard dial plates for Type 11 tuner. Melvin Rosenthal, 507 S. Maryland Ave., Wilmington Delaware 19804

--Marconi 106 receiver, A-K breadboards, crystal sets, Grebe CR-6, wireless books, parts, couplers, honeycomb coils, telegraph sounders & relays. Write: D. Shanks, 115 Baldwin Street, Bloomfield, N. J. 07004

--Dial face for Hallicrafter S-41G (Skyrider Jr.) & band spread dial for Hallicrafter Skybuddy. R. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, Calif. 94550

--Wireless receiver components WWI or earlier, electrolytic and xtal detectors, tuners, etc. Art Harrison, 1021 Falcon Dr., Columbia, Mo. 65201

--Ads & other info on SEE-ALL TV scanning disc. equip. of 1930. Schematics for Erla S-52 (not in Riders), Xerox ok for all. Bob Lozier, 318 E. Houston, Monroe, North Carolina 28110

--Instruction book or schematic for Mackey Mod. 128A Marine receiver, also Crosley Mod. 1 crystal set. Clarence Filley, W7KE, 1109 S. 2nd St., Hamilton, Montana 59840

--Bakelite socket board & tuning crank for Radiola III. Leland Smith, W5KL, Route #3, Jasper, Arkansas 72641

--National SW-3 coils, general coverage for Series 2: Nos. 60 thru 72 (from 35 mhz to 160 mhz. Bob Gunderson, W2JIO, 20 Central Ave., Old Bridge, N.J. 08857 or Tele. 201-251-4696

--DeForest F-5 or D-10, D-12, etc., also old wood blade ceiling fans. Will buy or trade. Send SASE for lists. Richard Cane, 8391 N.W. 21 St., Sunrise, Florida 33322

WANTED

--Webster 2A radio chassis with panel, also Radak amplifier and radio advertising items. Steve Lange, Box 33, Waldo, Wisconsin 53093

--Need diagram or service data on Hickok 277X AM/FM Signal generator, Geo. Boettcher, P.O. Box 255, Dingman's Ferry, Penna. 18328

--QST's before 1930. Please state price & condition. D. R. Klimaj, W4JVN, 5637 Heming Ave. Springfield, Virginia 22151

--Grid leak & antenna condensers for Radiola III or IIIA, wire recorder, AK-20 compact, 33, 35 unrestored. SASE. Rick Taylor, 7136 Lea Road, Chattanooga, Tenn. 37421

--Need cast metal drum dial for Winchester Arms receiver Mod. #5070. Charles Limouze, 475 Upper Grassy Hill, Woodbury, Conn. 06798

--schematics for Radio III-A & (4) WD-11 tubes. Have new 201As for trade, also need tuning pointer for Trirdyn speciciaL Have Eveready Mod. 20 for sale/swap. Louis Randall, 920 No. 5th, Ponca City, Oklahoma 74601

--Zenith Transoceanic Mod. 8G-005-Y that uses 8 tubes: 1LN5, 1LC6, 1LD5, L-1LE3, 1LB4 and 117Z6GT tubes. Send information Joe Garcia, 215 W. 108th St., New York, N.Y. 10025

--Early TV receivers, mechanical set with disc, CBS color wheel, 3" Pilot, early projection sets, any TV items from 20s & 30's. L. F. Babcock, 8095 Center Lane, E. Amherst, N. Y. 14051

--Everyday Engineering magazine, dated January, 1920. Joe Benne, 494 Hirsch, Calumet City, Ill. 60409

--QSTs before 1922, individual issues or volumes. Neil Friedman, N3DF, 2301 E Street, N. W., A-701, Washington, D. C. 20037

--Thompson Model 25 AFT (good), Radio News & Radio Craft before 1930, any radiolas, AFT for Arborphone Mod. 27 Dallas Swindall, 1112 San Jose Lane, Hanahan, S. C. 29406 (803) -744-0071

--To complete a AK-12, need the last two tube island complete with sockets for #5 & 6 tubes, switch controller, etc. Have complete island for #3 & 4 for trade. John Sudlow, R#4, Box 277, Syracuse, Ind. 46567

WANTED

--Any set and/or info from Slagle Radio Co. Write Bob Slagle, 2518 Pased Rd., Colorado Springs, Colo. 80907

--Tube chart and/or manual for Hickok Model 550X. Xerox or original. Maurice Murray, Rte. 1, Box 270A, Mt. Vernon, Ind. 47620

--Help in researching history of former Wilcox-Gay Corp., Charlotte, Mich. (1932-64. Especially in "Recordio" line of disc/recorder phono equipment. Dennis Morgan, 7734 Forestway Ct., Liverpool, N.Y. 13088

--Radio News with covers for 1922 (any or all months), Feb. 1923, Mar., June, Aug. & Oct. for 1925, June & Oct. for 1926. "Radio in the Home"-all issues. J. Albert Warren, Box 279, Waverly, Penna. 18471

--Need 2 rheostats with knobs for Westinghouse DA or junker DA for parts. H. Zeitlen, 3106 N. Third St., Harrisburg, Pa. 17110

--Circuit diagrams for Scott W121 Phantom, also for postwar Model 800. Will trade '41 Scott Lauriate manual for some on Mod. 800. Edgar Roy, 11 Rendall Rd., West Roxbury, Mass. 02132

--Dial escutcheon for Echophone Mod. 80 gothic cath. radio. If you have such a set, will pay for foto of dial. Also xerox of pages LIII, LIV, LV, LVI in Intro. to Vol. 1 of Riders. Richard Foster, 12 Shawmut Ave., Cochituate, Mass. 01778

--6 Escutcheons for 6U5 eye tube, sq. type preferred., 1 type CN 49121 coax plug for Scott RCH & S1RM sets. Any amount of Scott tube & dial shields. Have Scott dial repros for sale. Geo. Harris, 3212 36 St., Lubbock, Tex. 79413

--RCA Mod. 621TS TV, GE Mod. HM-225 TV console, Farnsworth Mod. GV-260 chassis & other early TV sets. Have radios for trade plus Riders Vol. 1-4. Gary Hough, 1725 N. Valencia, Santa Ana, Calif. 92706

--Want info on Winchester radio & table speaker (cir. 1928) made by Winchester Repeating Arms Co., New Haven, Conn. Mod. 5070. Tubes: 26-26-26-26-27-26-(2)71A. F. R. Tesche, 3728 Mosswood Dr., Lafayette, Calif. 94549 Tele. 415-284-5608

--Parts to build home brew replica of 1914-20 spark stn. such as brass binding posts, galena, gap, slide tuning rods & sliders, phone stopping condener, etc. Lou Vermond, VE3BDV, 47-539 Willow Rd., Guelph, Ont., Canada

WANTED

--Service manual including schematic for "Supreme Mod. 89 Deluxe tubetester". Will pay for copying. A-K breadboard for cash or swap. A. R. Nolf, 620 Auburn Cr., Burlington, Ontario, Canada L7L5B2

--Will pay $200 cash for RCA Radiola Grand or Radiola VIIB & IX. Must be good to mint with WD-11's. Will consider other conditions. E. E. Hite, WB4KFL, 107 Hillcrest Dr., Clemson, N. C. 29631 Ph. 803-654-1972

--Old meter catalogs (repro's OK) and meters any kind pre-1920. Indicate mfg., mod., ser. #, cash & condition. Leonard Cartwright, 10863 Northfield Square, Cupertino, Calif. 95014

--Silver-Marshall "Around the World Four" with coils if possible. Will pay good price. L. P. Rayner, 5512 N. 71st Place., Scottsdale, Ariz., 85251 Tele. 602-947-1375

--Tuning knob for Crosley 51, AK 3 tube TA unit with black paint, deForest plug-in coil holders: 3", 3 3/5", 3 3/4", manual for Kemper K-52 portable. Carl Weibezahl, 305 Belvidere Ave., Washington, N. J. 07882

--Sodion S-13 tube, cash or trade for WD-11. Also any info on Sodion receiving sets. Tim Martin, 42 Henry Ave., Pittsfield, Mass. 01201

--Need DA unit for RADA combination. Have AK, Radiola, Freshman and others for trade. Many dupes and spares. Chet Wisner, W1VSR, 1014 Main St., Dalton, Mass. 01226

--Radio Age, R. Journal, R. Engineering, R. Design, R. Broadcast, R. in the Home, Popular R. Cash or swap 1920s Radio News. Alan Douglas, Box 225, Pocasset, Mass. 02559

--Incandescent lamps, old, in working order unless unusual in form or age. John Wenrich, K2RY, 245 Bakerdale Road., Rochester, N.Y. 14616

--Echophone Mod. F cabinet and schematic; cab. for Grebe Sync. 7. Al Jochem, 2047 College Ave., Quincy, Ill 62301

--Crosley book type tuning condenser, Radio Annual 30S & 40S, RCA abridged service notes Vol. 2, knob for Freed-Eisemann rheostat, Riders Serv. manuals. Robt. Ireland, RFD 4, Box 140 Pleasant Valley, N.Y. 12569

Mail your ads early and do not make them too long for they will be cut. If too long, they will be deleted. See p. 14 for Instruct.

FOR SALE and/or TRADE

--Sell 386 issues of QST Amateur Radio booklets dating from 1929 to 1961. Sell all for $100. For more info send SASE to Larry Bianco, 194 Mt. Vernon, Ave. Medford, L. I., N.Y. 11763 Tele. 516-475-5888

--"The Old Timers Bulletin", complete Vol. 1, #1, Jan. 1960 to date, all orig. but 2 which are Zeroxed, Best offer one month from publication. Harold Voorhis, 105 New England Ave., #B2, Summit, N. J. 07901

--Swap Crosley Pup or Kennedy 281 or AK-10 breadboard for early General Electric microphones. Bob Paquette, 443 North 31 St., Milwaukee, Wisc., 53208

--1918 Duck Catalog (#11) professional reprint, 240 pages with hundreds of pixs of early wireless gear, excellent quality, satisfaction guaranteed. $7.00 ppd. book rate. Ann Schamberger, 515 Crescent Ave., Buffalo, N.Y. 14214

--Trade old books or tubes for same or cabinet for Atwater-Kent Mod. 30. H. B. Davis, 1209N. Market St., Dayton, Tenn. 37321

--Dumont scope, code practice tape player, tube tester, G-R bridge, 2 bat. radios, old brass meters, telephone parts, sell or swap. Want Grebe radio. SASE & 25¢ for details. Paul Roberts, RR 2, Otterbein, Ind. 47970

--Tubes, speakers, magazines, parts, meters, old test eqpt., radio paper. Ask for List CRL-77. SASE & 50¢. F. Frantz, 100 Osage Ave., Somerdale, N. J. 08083

--book "Nymph & The Lamp" novel by Thomas Raddall about ship/shore wireless pre-WWII in NE Canada, mentioned in OTB. Good condition $2.50 J. Jablin, W9IWI, 9124 N. Crawford Ave. Skokie, Ill. 60076

--sell/prefer trade S-M V. T. volt-ohm meter & signal tracer (Vomax) Mod. 900., Supreme Sig. Gen. & Freq. Mod. #582 with operating manuals. Want W. E. tubes & sound equip. John Schretzmayer, 140 Southern Blvd., East Patachogue, N.Y. 11772

--sell/trade complete chassis Kolster, Radiola VIII, Philco 86, AK-55, also 1935 Auto radio, exc. S-C 1935 console with meter & F. E. NR-5, Walt Worth, 2 West Elm Ave., Wollaston, Mass. 02170

--sell/trade AK-42, Radiola-7, RCA 828, Philco 630. Want AK or Philco cathedrals. Wayne Dimmler, 13 Midtown Rd., Carle Place, N.Y. 11514 (516-747-1325)

FOR SALE and/or TRADE

--trade Radiola Type AR, 3 stage RF amplifier minus three transformers. Will buy your rf transformers or trade you the AR amp. for something comparable. Joe Horvath, 522 Third St., San Rafael, Calif. 94901

--Sell or swap Riders #4 for RCA 1923-28 manual or for 1923-37 abridge vol., also BC-186 4 tube 2v. regen. rx @ $40 or swap. E. T. Montgomery, 1092 Willowbranch Ave., Jacksonville, Fla. 32205

--(3) WE 215A's in orig. cartons new @ $3. ea., RCA JRC 955 new @ $3., Cunningham CX220 @ $2., WE421A @ $2. All filaments OK. FOB, L. C. Hardy, W2QO, 522 Shirley Ave., Franklin Lakes, N. J. 07417

--Trade early Riders vols. for later ones. Available for trade: 1 thru 16 (1-5 not abridged). Want #20 thru 23. Cash deal also considered. A. Smith, Stonehedge, Lincoln, Mass. 01773 or Tele. 617-259-9351

--RCA osc. xfmr, 843 & UV201A tubes, Radiola 46 chassis, Radiola 3 box, panel & pointer, Radio News & Radio Craft, FB-7X, QSTs 46-72, CQ 49-66 partial. Tube part samples. Jack Nelson, W2FW, 915 Sherman Ave., Schenectady, N. Y. 12303

--Sell/swap battery sets, i. e. - Radiola 3, 3A, 18, 25 w/loop, Freed Eiseman, AK, Synchrophase, Fada, Freshman, Eagle, etc. Also many types tubes, headphones, magazines. Bill Laverty, R. D. 1, Box 62K, Egg Harbor, N. J. 08215

--Reducing collection, many battery sets, tubes, brass & bakelite WD-11s, 01A, 200s, Deforest in orig. cans, many early DC tubes, disc & cylinder phonographs. SASE. D. S. Dexter, 104 North Ave., Abington, Mass. 02351

--Sell/trade Rider Manuals Vol. 6 thru 19 with index, good condx. Make offer for lot, cash or xtal sets? Bound QSTs 1944-76, sell only. as set. L. W. Elias, W4DBT, 3919 Poindexter Dr., Winston-Salem, North Carolina 27106

--High quality custom engraving & plating: name plates such as for AK breadboard, deForest, etc. also satin finish dials, etc., carbon pot for RJ-4, cabinets unfinished, etc. SASE stating wants. Roland Matson, 388 Concord Rd., Billerica, Mass. 01821

--National NC-100XA (1938) restored @ $150. Hammarlund HQ-120 (1938) restored @ $100... or trade for cathedrals. Want escut. plate for Philco Mod. 70. Chas. Fowkes, WB4BOM, 1613 30th St., Bradenton, Fla. 33505

WITH THE COLLECTORS

This will be my last column reporting news on collecting in the OTB. Henceforth, I will devote all my time to the "Vacuum Tube News Letter" as noted on page 26. I want to thank the many contributors and wish them "Happy hunting !" --- Lauren Peckham

Fin Stewart (Faulconbridge, Australia) landed a Federal Orthosonic E-10 in mint condition. His bulb collection includes an 1890 British Robertson plus a Type 4060 Philips electrometer triode valve voltmeter which has unusual glassware.

Bill Denk (Devon, Penna) added a rare Murdock neutrodyne to his ever-increasing collection.

Chet Wisner (Dalton, Mass.) attended a flea market and came home with an AK-20, 35 and a mint Browning-Drake.

Frank Krantz (Somerdale, N. J.) writes that he sent a SASE to a collector for a sale listing. He received in turn 6 pages of material for sale -- but no name or address -- just an initial that looked like "CR" ? How about having a stamp with your name and address on sales lists fellows ??

The Peckham collection (Breesport, N. Y.) has expanded in 1977 with the latest items being an E. I. helix, Packard spk xfmr, Murdock condeners, early Firth receiver, Freed-Eiseman Mod. 345 portable and a mint "Pup" in original box.

Larry Flegle (Sheffield, Ala.) found a Stutz Simplex 1 tube receiver and an International Radio Co. Kadette Jr. pocket set.

Basil Abbott (Richardson, Tex.) found a Federal xtal set, a deForest F5 and a Federal A-10 plus a Signal Corp BC-9A.....

Julius Pilger (College Point, N. Y.) has been collecting only since 1973 but already has 150 sets. Recent additions include a Leutz Super DX 7 and an 8 ! He also found a Superfone using WD12s.

Bob Lessard (Mpls. Minn.) added several nice sets to his collection including a Freed Eiseman NR-5, NR-6, Stromberg Carlson 1A, David Grimes Duplex, Crosley IV, Browning-Drake and a Chelsea Super Five.

David Dazer (Sault Ste. Marie, Minn.) is a college student but still finds time to collect and so far has about 35 sets. He visited Germany recently and found that most collections over there do not include many early sets. One German collector remarked that a Freshman Masterpiece would be worth over $300. Dave has an Aeriola Sr., Westinghouse RC and many early tubes such as Sodions, etc.

(Ed. Note: On the subject of value of early radio gear overseas, we believe at least one collector (?) is buying sets at AWA "meets" and selling them in Europe at a handsome profit.)

MEETING OF MINDS

"OPINION"

I recently read in the Southwest Vintage Radio & Phonographic Society's paper "The Reproducer" (Oct. '77) an article by Glen Zook titled "Opinion". He speaks of the difficulty in establishing a "going price" for radio receivers such as the buyer's guide used for purchasing other antiques such as coins, furniture, etc.

Glen feels it is almost impossible at this time to establish a standardized price book. I wholeheartedly agree with him. After seeing some recent price listings and attending the AWA Historical Conference Auction in Dearborn -- anything goes !!

On two different occasions AWA has printed in the OTB an "average value" list for old gear. The values were out-dated before the Bulletin got to press !!

Geographical location, type of sale, difference of opinion in condition of receiver are but a few of the variables. Glen concludes his brief "Opinion" by asking "Who would compile such a value listing ?" That's the clincher ! Nice going Glen.

--- B. K. Editor

IMPORTANT!

1. A. W. A. does NOT, under any circumstances, accept tax deductible items without prior approval from Museum Committee.

2. A. W. A. does NOT appraise tax deductible gifts given to the Museum. All such items must be evaluated by an independent source for I. R. S. purposes.

RESTORING OLD EQUIPMENT

How did you SOLVE a problem when re-storing a receiver? Drop us a note telling how you did it.

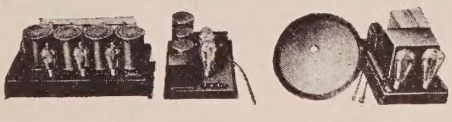
GROUNDING SPEAKER FRAMES

"Defect free" tube type receivers, usually requiring the use of an external antenna, are sometimes found intermittently prone to poor audio quality and/or audio breakup.

On analysis of a particular case, this clearly appears to be associated with thefact that the receiver was manufactured without any metallic inter-connection between the speaker frame and the set chassis.

The defect became much more noticeable when receiving weak stations. A radio frequency feedback condition is thus indicated whereby the speaker frame acts as a re-transmitting antenna for any un-suppressed R. F. or I. F. signal components present in the output stage.

Installing a speaker bonding wire alone completely eliminated this very evident audio defect in an otherwise good RCA model T8-14 all-wave table set. The RCA floor console counterpart Model C8 -15, is potentially beset by the same problem, as well as numerous other sets including other makes likewise having no speaker frame-to-bond.



The condition is considerably aggravated in the RCA models mentioned because the output transformers supplied are shielded and mounted on the "floating" speaker frame.

Installation of a speaker frame bonding wire where not present is considered a very worthwhile precautionary modification in most cases.

Cliff Meyers, W3YS
White Plains, Md.

BRIGHTENING A FINISH

I have found the best method of brightening the finish on a metal cased radio (such as an AK-55), to be the use of auto wax.

After cleaning the cabinet with soap and water (PLEASE remove insides first!), I rub the surface with a car wax that contains a cleaner. There quite a number of these on the market. I use the Ralley that comes in paste form.

After allowing this to dry, buff it off just as you would your car. You should find a finish like new.

Bruce Burkhardt, WA3MAS
St. Michaels, Md.

DON'T BE AFRAID OF WATER!

I was recently given two bushel baskets of old tubes (201A's, 226's 227's, 171A's, etc.) that had been stored in a barn for over 40 years. A spot check showed all the tubes to be good except they were covered with dirt, a questionable oily film, etc.

I started to carefully wipe each one with a damp cloth. After 15 tubes I literally "threw in the sponge--" for that is exactly what I did.

I took the baskets outside and grabbed the lawn hose. Turning on the water gently, I sprayed each tube gently and wiped/rinsed with a sponge.

After washing about 20 tubes, I would stop and dry/wipe them with paper toweling. Result: nearly 200 sparkling tubes with minimum effort.

--Carl Zeigler

CORRECTION: #5 slide in AWA Museum slide show is mounted in reverse. Turn slide over so contents of slide will match tape commentary.

Belden Marks 75th Anniversary

1902 – 1977

Congratulations to the Belden Company on their 75th Anniversary. This is another fine report documenting a pioneer company by George Hausske.

One of the few surviving radio related companies operating before the spanning of the Atlantic by wireless is Belden Corporation. It was started by Joseph C. Belden, a former Kellogg Switchboard and Supply Company Sales Manager who saw the need for a magnet wire company in the Midwest. While there were no radios or components with a Belden name plate, (magnet wire spools were marked Belden) this company must be considered as necessary to the radio business as Stan Laurel was to Oliver Hardy in show business.

Most of the wire products turned out by the rapidly growing concern were delivered to independent telephone companies. Silk or cotton-covered magnet wire were the popular items delivered from the first factory located in a fifth floor loft at 118 S. Michigan in Chicago, which later expanded to a Western Avenue and a Van Buren Street location.

Radio restorers have almost exclusively blamed soldering acid for the open windings they found in their coils and transformers. However, Mr. H. Wermine, a Belden Engineer and later Vice-President-Engineering of the Corporation, has pointed out that the early cotton wire coverings contained considerable amount of salt, which also ate through small wires. A washing process had to be instituted to cure this problem.

Rubber-covered wire production started in 1909, and in 1911 Belden perfected a flexible commercial enamelled wire. This led to much smaller and more efficient coils in all electrical devices. This enamelling process was evidently so good that two people tried to start up an enamelled wire business based on pilfered Belden information. They were promptly sued by Belden who won the case and had newly built machinery and ovens returned to them as part of the settlement. During this period, a noted radio pioneer was employed as one of them as a coil engineer: Mr. E. N. Rauland, of "All-American" transformer fame who owned Radio Station WENR. (Note the last three letters are Mr. Rauland's initials.)

In World War I years, Belden converted much of their facilities to making shells and webbing for military harnesses. They also turned out the fine wire required for headphones of the new aircraft wireless plus outpost telephone wire.

Belden Bus Bar and Rosin Core Solder were used by many radio manufacturers for their coils, transformers and wiring. Cloth-covered battery cables, including a rather unsuccessful fused type and antenna kits were other Belden products. Records of exactly which radio companies were supplied with Belden wire etc. are not available, but we are told that Belden supplied almost all manufacturers including Atwater-Kent, Magnavox and Scott. They do, however, have a letter from Thomas A. Edison requesting special consideration for a good customer during a wire shortage in 1920.

Genuine Belden Magnet Wire

Size	Your Price Double Cotton ¼ lb. Spools	½ lb. Spools	Your Price Double Green Silk ¼ lb. Spools	½ lb. Spools

One story in "Beldenews," the employees magazine, mentions a rush order of No. 40 single silk wire for Thordarson (I can't recall anything but enamelled wire in their products, can you?). Another story mentioned soliciting business from Newcomb-Hawley for the wire in their new 6-7 lb. field coils of dynamic speakers. Dynamic speakers were a real bonanza for magnet wire manufacturers.

(Continued on next page)

Radio News Magazine was the recipient of much Belden advertising in the golden era of radio. Some of the items and dates are listed below:

Oct. 1922	Radio coils
Feb. 1923	Insulated wires
Mar. 1923	Radio wires, coils and parts for manufacturers
Nov. 1924	Beldenamel aerial wire
Mar. 1925	Secret of a good aerial
Apr. 1925	Radio Battery cords
Nov. 1925	Belden Products
Dec. 1926	Fused radio battery cord
Nov. 1927	Aerial kits

Other magazines such as Citizen's Radio Callbook, Popular Radio and Radio Trade-Builder also had Belden advertising.

The Depression era was tough on Belden, but they survived even though they were building a new plant in Richmond, Indiana. Automotive wires and cables were some of their best items along with radio wires and cables after the Depression. During the 30s Belden marketed the first soft rubber plug and advertised they were saving the world from "corditis" -- worn and broken plugs and frayed cords. The 30s also saw the death of the Belden founder, Joseph C. Belden in 1939.

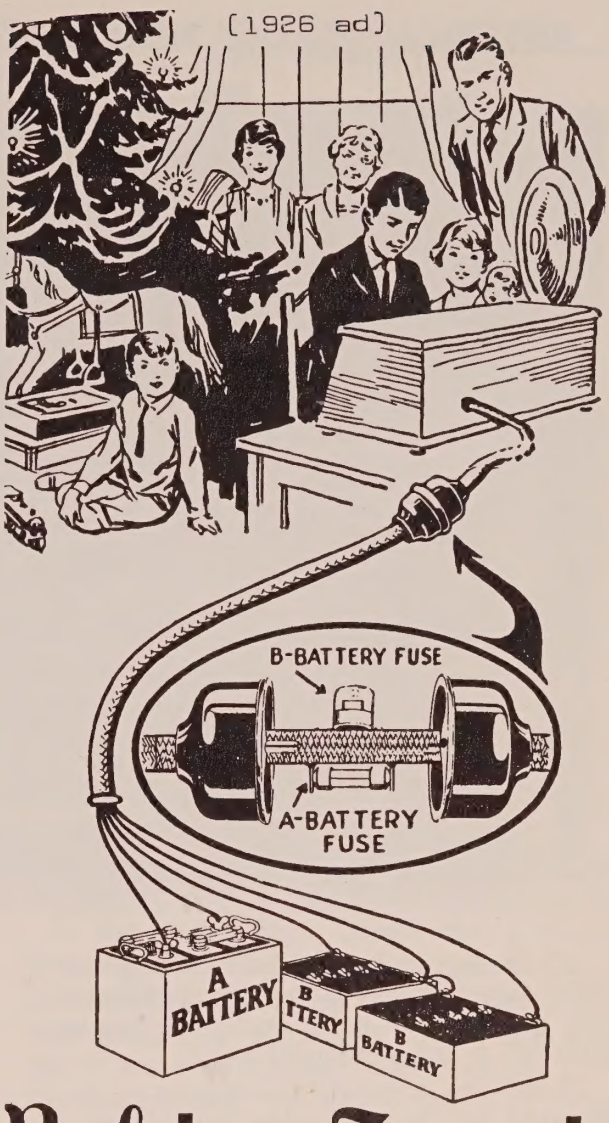
World War II came, and by 1942 Belden was manufacturing only war materials. This included wire for the world's most powerful land battleship, the 100% Belden wire equipped Chrysler M-38 28 ton tank, Dodge Army cars and trucks, Flying Forts, and Superforts.

The advent of permanent magnet speakers and transistorized equipment with smaller transformers results in less magnet wire being required and Belden has left their once thriving phase of the business to others. Today, Belden has research facilities and corporate offices at Geneva, Illinois, and an electronic division at Richmond, Indiana. Their present catalogs include almost all of today's wire and cable needs. Research is being done on fiberoptic cables and other items, so we can look forward to seeing the Belden name for many years to come.

I was invited to interview Mr. Wermine, a retired Belden engineer, who was most helpful. Mr. St. Onge, the Manager of Corporate and Marketing Communications furnished me all the company's published materials at the request of their President, Mr. R. W. Hawkinson. They have all been most gracious, and reading through their employee news letters suggests one big happy family, and I almost wish I'd been one of their employees.

— — George E. Hausske

[1926 ad]



Belden Fused Radio Battery Cord

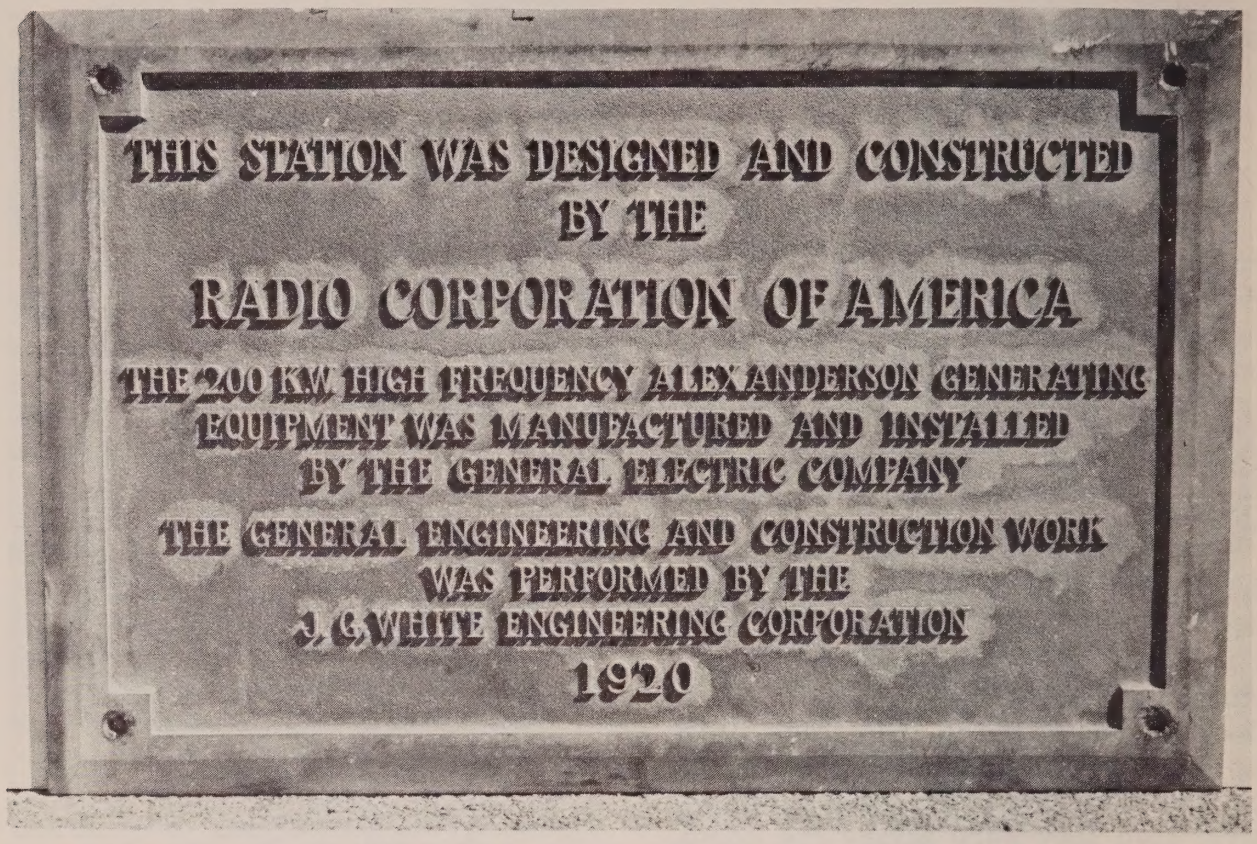
THOUSANDS of radio set owners are improving their sets by adding the protection of the Belden Fused Radio Battery Cord. The two small fuses in the neat bakelite two-piece cover are on guard, night and day. The A-battery fuse prevents the damage caused by accidental short circuits. The fire hazard is eliminated.

The small B-battery fuse is protection for the tube filaments in case the B-battery voltage is accidentally applied to A-battery terminals.

The Belden Fused Radio Battery Cord is a Christmas gift of all-year utility. Ask your dealer about it, today!

HISTORICAL STATION MARKER AT FOOTHILL ELECTRONIC MUSEUM

Report by Thorn Mayes, W6AX



RCA recently announced the sale of 2300 acres of its property at Bolinas and Point Reyes,California, to become part of a large coastal park.

These are historic locations as indicated by the following note from "Modern Electrics", April, 1913.

"The Marconi Wireless Telegraph Co. has placed contracts with the J.C. White Engineering Co. of New York City for the erection of eight wireless telegraph stations, two pairs for Atlantic service, two pairs of Pacific service. Receiving and sending stations 30 miles apart will be constructed at Oahu, in the Sandwich Islands; Tamales Bay and Bolinas, California; near Belmar, N.J. and in eastern Massachusetts at a point not yet definitely selected."

"These stations will be part of a globe-girdling system that will continue to the west by the way of Japan and thence ultimately to India.Twelve towers ranging in height from 400 to 450 feet will be spread out over a semi-circle covering a square mile at each station, and it is estimated that the range of each station will be 4,000 to 6,000 miles."

A large two story concrete building was erected at Bolinas to house the 300 KW Marconi timed spark transmitters and their auxiliaries. Similar equipment was installed at Kahuka to work the Japanese station at Funabashi near Tokyo.

When wireless stations were returned, by the Navy, to their owners after WWI, RCA had taken over the assets of the Marconi Wireless Telegraph Co. of America and based on the performance of the 200 KW Alexanderson transmitter at New Brunswick, N.J., decided to replace all the Marconi 300 KW timed spark sets with continuous wave alternator transmitters.

In 1920 when this change was made at Bolinas, a commemorative bronze plaque two feet high by three feet long,shown in the picture above, was mounted on the station house.

The KPH spark transmitter, used for ship-to-shore work was also moved from its pre-war location at Hillcrest,South San Francisco, to Bolinas, the receivers to Marshall, California 25 miles tothe north of Bolinas on Tomales Bay. This transmitter was replaced by a tube set in 1927 and later the receivers were moved to the station on Point Reyes.

By 1935, the Alexanderson transmitters had been replaced by shortwave tube sets having a much greater range, using less power, These sets were used for point-to-point communication with the Orient and South Pacific without

[Continued on next page]

[Marker at Foothill Museum]
the need for relaying via Hawaii.

At the peak, a maximum of fifty transmitters were used for this service. The traffic has gradually been taken over by satellite and cable until now all of the old point-to-point sets are idle.

Shipto-shore traffic is all that is being handled by Bolinas and Point Reyes, which is the reason RCA is reducing its land holdings.

RCA has given the bronze plaque with pictures of early equipment to the Foothill College Electronic Museum. An initial display will be made at the Museum of these artifacts; later the plaque will be mounted permanently on one of the entrance walls of the Museum thus preserving the record of a famous West Coast trans-oceanic wireless station.

WESTINGHOUSE PLACES PLAQUE AT ORIGINAL KDKA SITE

The Company's East Pittsburgh Plant was officially designated recently as the birthplace of radio broadcasting.

A special ceremony, highlighted by the unveiling of a historic marker, recognized the roof of the Divisions' K-Building as the site of KDKA's—and the world's—first commercial radio studio. The event attracted many Westinghouse, union and government representatives, as well as radio and television personalities and media reporters.

The marker reads: "This plaque marks the historical location of Westinghouse Radio Station KDKA, the world's first commercial radio station and the site of the first and most famous broadcast—the Harding-Cox Election Returns on November 2, 1920. Erected on June 17, 1977, by the Turtle Creek Bicentennial Commission and Westinghouse Electric Corporation under the Pennsylvania Historical and Museum Commission Historic Sites and Landmarks."

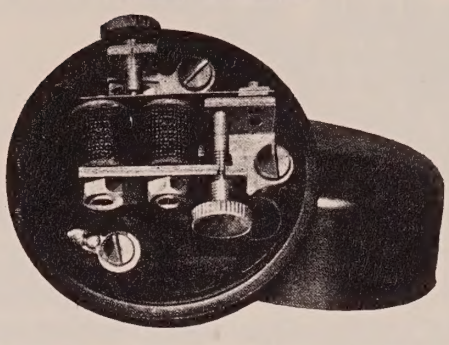
Reminiscing about the early days, Mr. Arlin mentioned that he was a Time-Study Engineer at East Pittsburgh when he first participated in radio; he recalled "talking on the air with Will Rogers." He retired as Industrial Relations Manager, Mansfield Plant, in 1961 after 43 years' service.

[Charles Grissinger]

Mark 50th Anniversary

On Sunday, Sept. 18, the Columbia Broadcasting System celebrated its 50th Anniversary (1927-1977) with a 3 hour program. AWA member Rod Phillips (KYW) contributed some of the material for an entertaining review of CBS highlights in radio.

TEST BUZZER



On several occasions visitors to the A. W. A. Museum have asked why some of the early commercial receivers (W. S. A. and Marconi) had a buzzer in the front panel. In fact, one visitor even spotted a small buzzer on an old wavemeter.

The answer is easy: to generate a radio signal.

Yes, the sparking from the buzzer contacts create a radio signal which enables the receiving operator to adjust the catswhisker on the crystal detector (find a sensitive spot).

In the early days (when there were few signals) the operator had no way of knowing when the crystal detector was properly adjusted. When the signal from the buzzer was loudest in the earphones, he knew the set was ready for tuning DX.

A buzzer in a wavemeter acted as a small calibrated Transmitter. Tuning a receiver to the nearby wavemeter buzzer signal enabled one to calibrate a receiver (or a transmitter).

On the subject of buzzer transmitters, they were used for short haul work during WWI and many an early amateur used a buzzer for his first transmitter when he would successfully work another would-be-ham in the same neighborhood. The buzzer was one step below the famous Ford spark coil transmitter !

OLD TYME XMTR CONTEST
Jan. 11 - 12
19 - 20
See details elsewhere in Bulletin....

A.W.A. ON THE AIR

Send all old time transmitter construction and operation news to: W2BGN
Ken Gardner
42 Oakdale Ave. S.
New Hartford, N.Y. 13413

OLD TIME TRANSMITTER CONTEST

OBJECTIVE: Qso the greatest number of AWA members. When calling use: "AWA AWA AWA de W2AN" as an example. On contact, exchange year of equipment such as a 1936 transmitter would be "TX 36" and a 1930 receiver would be "RX 30".

DATES: Wed., Jan. 11, 2300 Z to Thurs., Jan 12, 2300 Z.
Thurs., Jan. 19, 2300 Z to Fri., Jan. 20, 2300 Z.

FREQUENCIES: 3580 to 3590 Kh. and 7040 and 14084 Kh. plus or minus QRM. Concentrate 40 and 20 mtr qso's on the hour.

SCORING POINTS:

1 for QSO with 1940 or later station
2 " " " 1939 or earlier TX or RX.
3 " " " 1939 or earlier BOTH TX and RX.

POINT MULTIPLIERS:

2 for station using 1939 TX or earlier
2 for station using 1939 RX or earlier

RULES: A station will be scored only once on each band. No crossband contacts. Non-member contacts will not count.

SEND LOG COPIES to:

Ken Gardner, W2BGN
42 Oakdale Ave., South
New Hartford, N.Y. 13413

before MARCH 1st, 1978

The dates: Jan. 11-12 and Jan. 19-20

Example of scoring: Total points for stations worked and multiply by 1.0 if you used modern gear, 2.0 if you used either an early TX or RX or 4.0 if you used both old TX and RX.

Look for Special Event Station KM1CC between Jan. 14-22 who will be celebrating Marconi's 1st two-way transatlantic transmissions.

AWA NET LIST

An up-to-date list of all AWA Net Members is now available. The list includes both CW and SSB participants and gives call, handle and QTH. Send SASE to:

Ken Gardner
42 Oakdale Ave. S.
New Hartford, N.Y. 13413

AMATEUR RADIO CLASSES

In conjunction with the Canandaigua Radio Club, AWA is again having amateur radio classes under the direction of Henry Blodgett, W2UTH/FRL. The group meets every Wednesday evening at Henry's home [Victor, N.Y.] where both code and theory are taught for Novice and General licenses. Several have already obtained their license and are on the air. Local AWA members who may be interested should contact H. Blodgett or B. Kelley.

BACK ON AIR AFTER 30 YEARS

Word has just been received that Morgan McMahon, well known radio historian and publisher, started at "zero" in the FCC office and walked out with his Extra license. Congrats Morgan ! (Before 1947, he was W6TPE)

AWA NETS

PHONE [SSB]
Sunday ---- 12 noon 3903 Kc.
Tuesday --- 8 P.M. 3866 Kc.
Monday -- Wednesday -- Friday 9:30 A.M. 3866 Kc.
Tuesday -- 2 to 3 P.M. 14270 Kc.
CW [Code] 3584 Kc.
First Wednesday of each month 8 P.M.
Daily --- 4 P.M.
Note: Frequencies are subject to plus/minus 3 kc. to avoid QRM and are E.S.T. [or E.D.S.T.

NET OPERATION

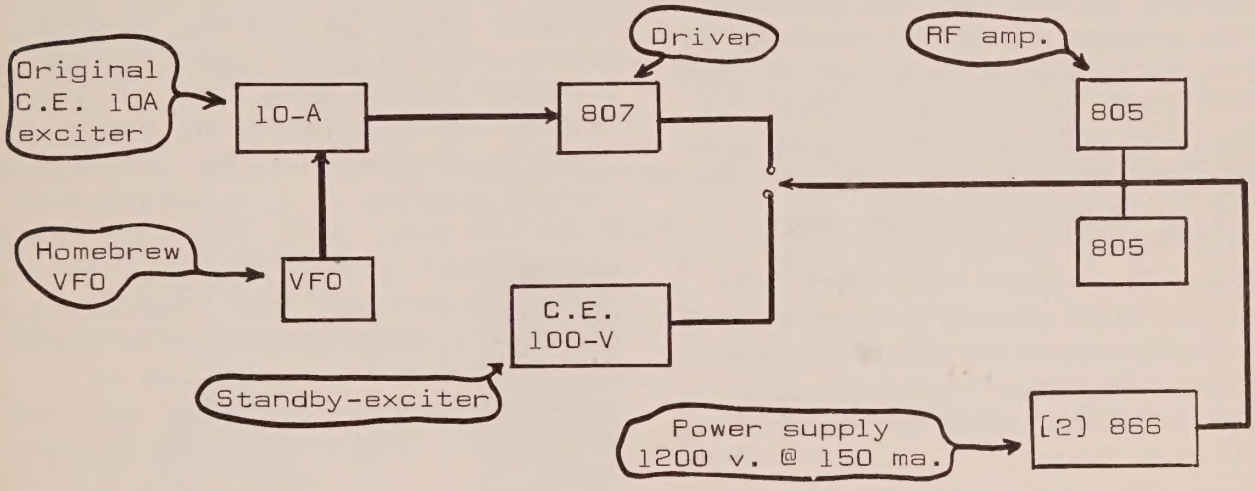
W2AN ON THE AIR

A.W.A. Amateur Station W2AN can be heard regularly on several amateur bands. Members and visitors to the Museum have at their disposal a fine CW setup which is always ready for operation on either 40 or 80 CW.

The transmitter is a B&W 5100 (donated by W2RIZ) with a National NC-173 for receiver. Both straight key and Vibroplex are available. All equipment is of 1950 era.

Phone operation is confined to the old Museum (annex) where W2ICE has gone to much trouble to get ancient gear in operation. The layout below is self-explanatory. Operation is normally confined to the 75 meter AWA SSB Net. Coils are not available for other bands.

Several CW transmitters of 1920 and 30 vintage are also available and used during the Old Time CW Contests. They have been described in earlier Bulletins.



With the exception of the two early ssb exciters, all parts and tubes are approximately 40 years old (1937) and are breadboard mounted. Two National receivers are used: SW-3 (1931) and a HRO (1935 model with 2.5 v. tubes). The 10-A setup is quite a challenge requiring adjustment of 8 knobs for any great frequency change ! The SW-3 works well on SSB providing QRM is at minimum. A short antenna of only 6 feet works great since it prevents strong signals from "swamping" the front end. Anyone working W2AN will be given (on request) an old time '2AN" qsl card.

A.W.A. AT FT. VANCOUVER HAM FAIR

"Tex", W7AHK had practically a one man AWA historical exhibit at the HAM FAIR. He reports having a great time, lots of interest and an invi tation to return next year. One of the highlights of Tex's exhibit was a beautiful Scott "World's Record Shielded 9" receiver. As frequently the case, the display was next to the ARRL Booth [AWA is an ARRL Affiliate].

TELEVISION EXPOSURE

Historical radio and collecting early sets received a nice boost recently when Larry Flegle had an opportunity to tell about his hobby over Channel 3 Cable TV in Florence, Ala.

He told about A.W.A. and its objectives: preserving and documenting historical radio. As an example, he showed the television audience several early receivers he had restored. Good going Larry!

On Review

TYNE'S SAGA

Yes, the book is on the market and is everything we expected it to be. Not only is the book of value to the collector identifying tubes, but it is an endless source of information to the radio historian. It is currently available from VINTAGE RADIO. See next page.

SW-2

So you've never heard of a SW-2 receiver ? You're not alone. The SW-2 was manufactured briefly by National in 1928 for use with the then popular mechanical scanning TV receivers. The set was one of the first made by National -- prior to this they made components for the famous Browning-Drake BC receiver and miscellaneous parts.

The SW-2, as the name implies, was a Short-Wave set with "2" tubes-- 222 untuned RF and a 112-A regen detector. An added resistance coupled amplifier was required to give sufficient output to operate the TV neon lamp.

The set is of particular interest since it is the grandfather of the famous SW-3 (there was a shortlived SW-4 in between).

An exceptionally well written and illustrated article by Bill Orr, W6SAI can be found on this rare receiver in the October, 1977 issue of "CQ" magazine, page 18.

"LIGHTNING IN HIS HAND"
The Life Story of Nikola Tesla

by Inez and Wanetta Draper

"Lightning in His Own Hand" is a warm personal study of Nikola Tesla. The authors portray the human side of this scientific superman who perfected alternating current and numerous other inventions. The soft cover edition is $4.00 and hardcover at $8.95 Write to:

OMNI PUBLICATIONS
Box 216, Hawthorne, Calif. 90250

RELICS OF THE ELECTRICAL AGE
by Robert Belfield

A directory of public and private repositories in the United States and Canada.

This booklet (48 pages) was sponsored by several historical agencies including the IEEE and the Smithsonian. Information on many of the private museums was obtained from a brief questionaire sent out with a 1974 OTB.

Several members at AWA Headquarters have scanned the book and find it of great value. Museums are listed by State (Zip) and Province giving the following information: city, type of museum (public or private), visiting hours, owner's name, address and telephone number plus a brief description of artifacts to be seen.

Only two criticisms: the information was gathered in 1974 and the book printed in July, 1977. There are many names listed (private museums) of AWA members who have been dead for several years. This can be overlooked, but in the same three year period 20 to 30 exceptionally fine museums have been founded and are not listed.

The other criticism is minor. Several felt there should be some distinction (separate listing or bold letters) between public and private museums. Some large public museums have less copy than a small private museum with only a half dozen broadcast sets and maybe a dozen books. But then -- maybe we shouldn't have discrimination !

Want a copy ? Write:
Division of Electricity, Smithsonian Institution, Washington, D.C. 20560

Morse Lives On

A new Quarterly Journal will shortly be launched titled THE TELEGRAPHER. It will print articles dealing with the rise of communication (landline) technology from the early 1800's to present. It promises to be a great publication. More later.

On Review

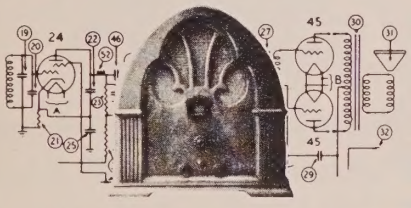
It is hard to believe, but we have AWA members who have never heard of the fine series of historical books published by Vintage Radio. Most have been reviewed in previous Bulletins. They are all highly recommended.

VINTAGE RADIO 1887-1929

You'll enjoy this fascinating pictorial story of pioneer days in wireless and radio. Relive the days of Marconi, old spark transmitters, and the struggles of early radio broadcasting. It's the radio collector's reference, with over 1,000 pictures on 263 pages.

HARD-COVER $10.95
HANDBOOK $8.95

CIRCUIT DIAGRAMS



We will research any pre-1951 radio model and send you the circuit diagram and any other available repair information. We'll also tell you the year in which that model was introduced. Your money back if we don't come up with at least a circuit diagram!

We now have Canadian diagrams, too!

ANY RADIO MODEL $3.50

FROM TIN FOIL TO STEREO

Here's your second edition of the 1877-1959 phono classic, now extended to 1976.
HANDBOOK $9.95

A FLICK OF THE SWITCH 1930-1950

Here's your time trip through the great days of radio broadcasting and the dawn of television. Revisit the Lone Ranger, Philco "cathedral" radios, old "Ham" days and many more. You'll revel in 312 pages of story, old ads and over 1,000 pictures.

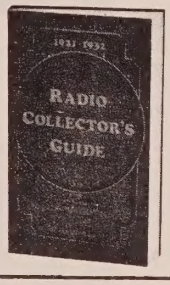
HARD-COVER $10.95, HANDBOOK $8.95

SAGA OF THE VACUUM TUBE

by Gerald E.J. Tyne

Released November, 1977. This is the book every radio historian has been waiting for: 494 pages with over 500 illustrations. The history of the vacuum tube starting in the 1800's through to 1930. A gold mine of information. Handbook- $9.95 Hard-cover $19.95

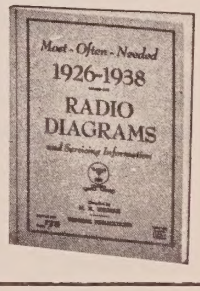
1921-1932 RADIO COLLECTOR'S GUIDE



This book makes you an "instant expert" as you go prospecting for those fine old radios. It eliminates guesswork in determining a set's age and "pedigree." There are 264 pages loaded with over 50,000 facts on 9,000 radio models made by 1,100 manufacturers.

HANDBOOK $6.95

MOST-OFTEN-NEEDED 1926-1938 DIAGRAMS



This reprint of Morris Beitman's Supreme Publications book shows circuit diagrams for 600 radio models. Its 240 pages are valuable for historical circuit information, and are great aids in restoring those old sets. Made from Supreme's original artwork, it is clear and readable.

HANDBOOK $7.00
Also 1941, 1942, 1948 and 1950 Editions $4.00 each.

J.W.F. PUETT'S SILVER GHOSTS

E.H. Scott and his immortal radios have been recaptured in 72 pages of pure Scott. Includes circuit diagrams of all the truly classic models, along with old ads, articles and the story of E.H. Scott's creative life. If you have a pre-1946 Scott radio, or hope to own one some day, you've got to have this book.

now only $7.95
BE A SCOTT EXPERT FOR ~~$10.00~~

Mail order to: **Vintage Radio** P.O. BOX 2045 PALOS VERDES PENINSULA, CALIF. 90274

Meet the Collectors

What's Happening

The column WITH THE COLLECTORS is being dis-continued with this issue. With the increasing interest in vacuum tube collecting, Editor Lauren Peckham feels he can provide a better service to AWA by devoting more time to the Vacuum Tube Bulletin. Tube collectors are urged to join this group. Send $2. to Lauren Peckham, Breesport, New York 14816

Basil Abbott (Richardson, Texas) is the lucky owner of a very rare Western Electric Model 14-A Speaking Telephone outfit (amplifier) and from the picture he sent, it appears "mint". Of interest is the fact it is powered by a W.E. 2-A A.C. supply featured in the Sept. OTB, page 25. The built-in speaker unit is a 527-A with a Dec. 13, 1921 patent date. AWA has a 14-a but someone long time ago decided to exchange the UV sockets for UX. Why couldn't they leave it alone!

A.M. Zellmer (Sacramento, Calif.) writes that he recently was on a project installing what may be the farthest western FM stereo broadcast station -- a transmitter at Nome, Alaska on the Bering Sea.

On the subject of broadcast transmitters, Art Goodnow tells us that he recently did some work on KDKA's transmitter (Pittsburgh) on a part-time consulting basis. Art is retired Director of Engineering for the Westinghouse Broadcast System.

Speaking of faraway places, Charles Wooten writes from Turkey where he is on temporary assignment. He gave the impression there are very few old broadcast sets in the area..

RADIOLA 28, 8 TUBE SUPER-HET RECEIVER

RCA

Complete with 8 R.C.A. Tubes

This exact set listed for $260.00. This is a "Second Harmonic" Superheterodyne. It uses a loop aerial, no outside aerial being necessary. Tunes from 200 to 550 meters. Has an ample compartment for all batteries directly under the catacomb which is easily accessible by raising hinged upper section of receiver.

Uses 7 U.X. 199 Radiotrons and 1 U.X. 120 Radiotron Power Tube, which have a low drain on the batteries. Batteries required are 12 No. 6 regular Dry Cells, 1 22½ volt "B" Battery and 3 45 volt "B" Batteries. However if so desired this receiver can be completely electrified by using suitable eliminators. (WE SUGGEST THE POWERIZER No. 28 A. B. & C. ELIMINATOR, WHICH COMPLETELY ELECTRIFIES THIS RECEIVER AND ADDS A STAGE OF 210 AMPLIFICATION WITHOUT CHANGING ANY OF THE WIRING IN THE RECEIVER. SOLD AT SPECIAL PRICE OF $16.50 LESS 210 and 280 TUBES).

This set is powerful and sensitive and ideally suited for the home, camp, boat, farm, etc. Every one brand new and packed in original cases.

Has a beautiful two tone mahogany cabinet. 38" tall (plus 25" for loop itself) 27" long and 16½" deep.

Complete with 8 R.C.A. Radiotrons and Loop.

Stock No. S-14 ..... **$13.75**

A "depresssion" bargain

Western Union

PIONEER COMMUNICATION CO. COMPETES WITH MODERN TECHNOLOGY

In the suburban New Jersey office where Western Union Corp. Chairman Russell W. McFall labors on the world's longest turnaround, there is an oversized rolltop desk. Behind it is a grandfather's clock, chiming the hour. So much for tradition. A couple of floors below McFall's office is a network communications center full of blinking lights, chattering data terminals, symphony music piped in from the Western Union Westar satellite. That's a symbol, too, but of the future.

In 1965 the soft-spoken McFall, an alumnus of General Electric and Litton Industries, became at age 43 the youngest president in Western Union's 126-year history. The nation's original communications common carrier (it built the first transcontinental telegraph line in 1861) was chained to the dying telegram business and burdened by an enormous, aging work force. It was kept afloat largely by a sympathetic government and the sufferance of American Telephone & Telegraph on whose leased long lines it was almost totally dependent.

McFall brought Western Union into the 20th century. The decline and fall of the telegram has continued; last year, telegrams were down to 11% of total revenue. In their place, Western Union has put a modern domestic telecommunications network, including a 9,000-mile microwave system that is second (distant, but still second) only to Bell's. In 1974 it launched the nation's first domestic communications satellites. It invented Mailgrams with the U.S. Post Office, now nearly a $50-million business.

This year it nailed down three important contracts for its growing government-related business: satellite transmission for the Corporation for Public Broadcasting System's nationwide television network, a sophisticated data and message service for the U.S. Department of Defense, and a $796-million satellite tracking system for the National Aeronautics & Space Administration.

[Reprinted by permission of FORBES Magazine From Aug.1, 1977 issue.]

A.W.A. CELEBRATES 25th ANNIVERSARY

The World's Oldest and Largest Organization Dedicated to Preserving and Documenting the History of Radio.

ANNUAL CONFERENCE SMASHING SUCCESS!

--Ralph Williams and Vance Phillips receive HOUCK AWARD !!
R.H.G. MATHEWS steals SHOW !!
Joe Pavek gets Conference AWARD!
Contestants throw STEEL DARTS at Judges !!
--Fantastic AUCTION !!
Tyne's HOT BOOK is made available to first hundred in line...!
TOP programming for radio buffs..
MUSEUM and VILLAGE top attraction for all !!
--and much, much more. Complete story in next BULLETIN.

BACK ISSUES

Historical reference and good reading.....

The following OLD TIMERS BULLETINS remain in stock. Make out check to A.W.A. and mail to:

DEXTER DEELEY
8 Briar Circle
Rochester, N.Y. 14618

Vol. No.	Vol. No.	Vol. No.
15 - 1	17 - 2	18 - 3
16 - 2	17 - 3	
16 - 3	18 - 2	

$1. each ppd.

11 - 3	13 - 3	17 - 1
12 - 1	15 - 2	*17 - 4
12 - 3	15 - 3	
13 - 1	15 - 4	

$2. each ppd.

*Note: 17-4 is Special Anniversary Issue and Master Index.

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5 - 4	11 - 1	14 - 2
7 - 1	11 - 2	16 - 1
7 - 4	12 - 2	18 - 1
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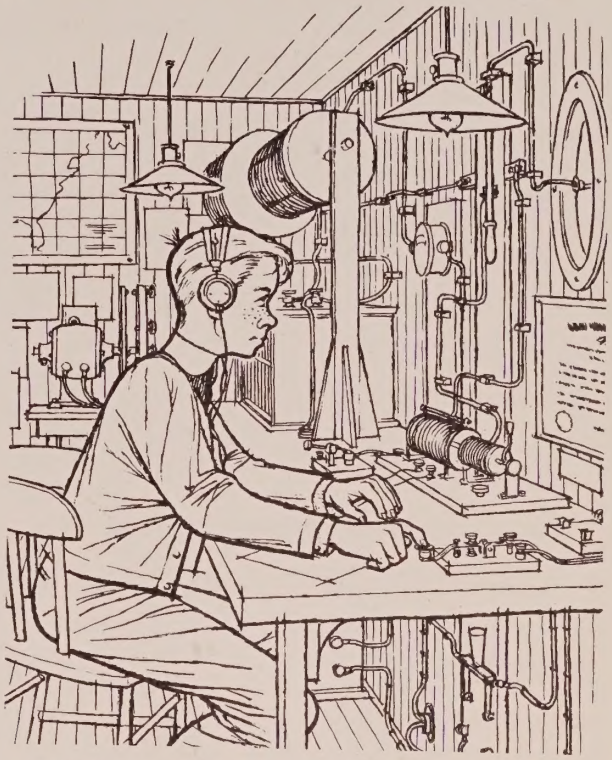

THEY ALWAYS CAME BACK!

by Dave Middelton, W5CA
HAM RADIO magazine, October, 1977

In the early days, AWA used to publish lengthy articles which were printed separate from the AWA BULLETIN. These historical "gems" were mailed with the Bulletin and were called MONOGRAPHS and consisted of several pages.

As the OTB grew in size, the Monograph was discontinued and lengthy articles restricted in size [with the exception of few articles such as the "All-Metal Tube" series.]

One of these early MONOGRAPHS was printed 15 years ago [Winter, 1962] and titled "They Always Come Back". It is a sentimental story with a nostalgic twist that holds the reader to the very end. Clever art work [above sketch] by Larry Triggs's son Jim adds the final touch.

Such a good story deserved wider publication, so Dave Middelton, the author, had it published in HAM RADIO magazine. Want a copy of the original 4 page MONOGRAPH? Send 25¢ in stamps to AWA Headquarters, Holcomb, N.Y. 14469

THE MUSEUM

A.W.A. HISTORICAL MUSEUM

East Bloomfield, N.Y.
Bruce Kelley, Curator

Museum Hours:

Sunday ——— 2 to 5 P.M.
Wednesday ——— 7 to 9 P.M.
May through October

Open to groups by appointment
Tele. (716) 657-7489

Free Admission

Museum Telephone:
(716) 657-6260

The Elwood Collection

S.O.W.P. "SPARKS" Journal
Vol. 1 No. 2

Unfortunately, all AWA members do not belong to S.O.W.P. but those that do had the good fortune of viewing and reading about an outstanding collection of radio and telegraph keys in the recent SOWP Journal.

Seven large pages were covered with pictures of unusual keys from John Elwood's collection (who is also an AWA member). John's collection embraces everything from early camelbacks to a "Blue Racer" --- all beautifully photographed. The article will enable members to identify certain keys in their collection since there is a description with each photograph.

New Equipment

in A.W.A. MUSEUM

HARDWARE: W7WQ, W7FS, W2YE, W8TE, W2RVS, W2KTI, W2QO, WA2BFQ, W2HA, K2LMV, K2LBB, W3CFC, Tudor Rees, H. Miller

SOFTWARE: W2YE, W2ABD, W8TE WB3AVK, W2RVS, W3CFC, Richard Schreck, Fin Stewart

The Museum was recently the recipient of Andy Shafer's (W8TE) early amateur wireless station pictured on page 6, September, 1971 OTB.

The 1915 station has been setup on the third floor and is a stellar attraction. AWA is indebted to Bill Biddle, K8UZ who made arrangements to acquire the equipment.

Next year (1978) AWA will feature a new tube exhibit showing vacuum tube development in U.S.A. and England. The British display has been strengthened with a rare Marconi Type "TN" tube from Lauren Peckham.

The "TN" was the first practical transmitting tube made in England and will be a companion to the equally rare Round "N" receiving tube -- a gift from Bob Ryan.

These tubes are pictured in Alfred Goldsmith's book "Radio Telephony" on page 175 and were made in the early 'teens. The prize in this series is, of course, the priceless 1905 Fleming Valve, a gift from the British Marconi Co., Chelmsford, England.

WIRELESS SHOW

Visiting England this winter ? If so, don't fail to attend the Wireless Show at the Victoria & Albert Museum in London where there will be a special exhibit of receivers made between 1922 and 1925 plus later models.....